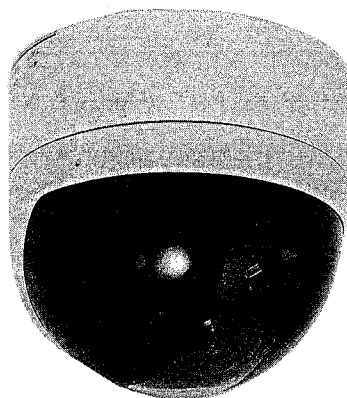


# Service Manual

Colour CCTV Camera  
WV-CF20



## SPECIFICATIONS

Power Supply :

Pick-up Device :

Scanning System :

Horizontal Scanning Frequency :

Vertical Scanning Frequency :

Horizontal Resolution :

Vertical Resolution :

Video Output :

Signal to Noise Ratio :

Minimum Illumination :

Maximum Cable Length (5C-2V) :

Angular Field of View :

ALC :

Video Output Jack :

Ambient Operating Temperature :

Dimensions :

Weights :

To be supplied from the specified monitor WV-CM110A or  
Camera Drive Unit WV-PS11A (12V DC, 350mA)

682(H) X 582(V) pixels, 1/3" Interline Transfer CCD

4.82(H) X 3.64(V)mm (Equivalent to scanning area of 1/3"  
image size)

2 : 1 interlace

15.625kHz

50Hz

More than 430 lines at center (WIDE)

More than 400 lines at center (WIDE)

1.0 Vp-p / 75 ohms composite video signal

More than 44 dB (AGC OFF)

8Lux (with the Dome Cover)

Approx. 500m

41.5°(TELE)-76.7°(WIDE)

31.9°(TELE)-59.8°(WIDE)

H/L (Volume)

Diameter 2.5mm jack

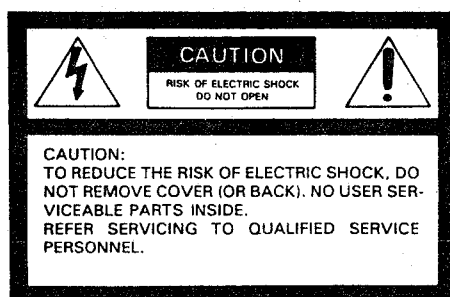
-10°C - +50°C

120(D) X 110(H) mm

600 g

Weights and dimensions indicated are approximate.  
Specifications are subject to change without notice.

# Panasonic



This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.



This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

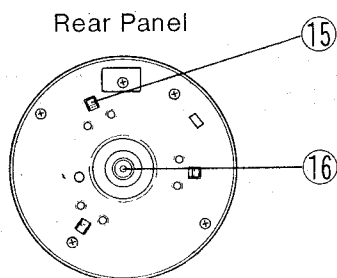
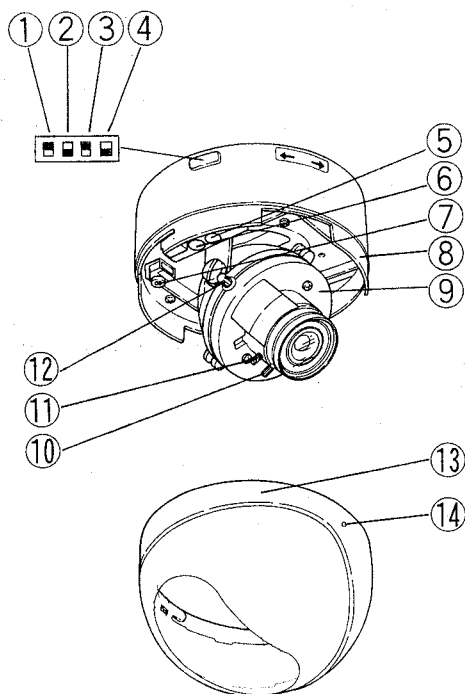
### IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacture.

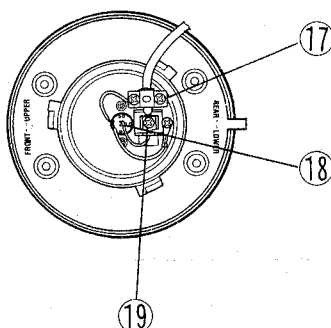
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## MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



Camera Fixing Angle



### 1. AGC ON / OFF Switch (AGC ON / OFF)

This switch is used to select the gain of the video amplifier as follows.

ON : The lens iris is fully operated at low light shooting, a clear picture is obtained by automatic increase of the gain.

OFF : A natural and low-noise picture is obtained under a low light condition.

Note : This switch is preset to the ON position at the factory.

### 2. Back Light On / Off Switch (BLC ON / OFF)

When back light affects the picture, set this switch to ON position for a clear picture. See page 2 for more details.

### 3. Picture Detail Selection Switch (PICTURE SHARP / SOFT)

This switch is used to select the sharpness of the picture.

SHARP : The sharp picture is obtained.

SOFT : The soft picture is obtained.

Notes : 1. When connecting the WJ-450 Color Quad Unit to this camera, set this switch to the SOFT position.

2. This switch is preset to the SHARP position at the factory.

### 4. Microphone On / Off Switch (MIC ON / OFF)

By setting this switch to the ON position, the audio function can be obtained.

### 5. Audio Control (AUDIO, MAX / MIN)

The audio level can be adjusted by turning this control.

This is preset to the MAX position at the factory.

### 6. Auto Light Control (ALC, H / L)

This control should be used only for shooting the object in unusual lighting condition.

Do not adjust this control except the above condition.

Note : To use this control, be sure to set the Back Light On / Off Switch (2) to the OFF position.

### 7. Video Output Jack (VIDEO OUT)

This jack is used to adjust the angular field of view or focus while observing the picture on the monitor.

**8. Panning Table**

This is used to adjust the Right / Left Angle of the camera.

**9. Camera Head**

This is used to adjust the Up / Down Angle of the camera.

**10. Focus Ring**

This is used to adjust the focus.

**11. Zoom Ring**

This is used to adjust the angle of view.

**12. Lens Holders**

These are used to adjust the picture tilt.

**13. Dome Cover**

This cover is used to protect the camera head.

**14. Microphone Holes****15. Hooks**

These are used to mount this unit to the Camera Fixing Angle.

**16. F-socket**

This socket is connected with the F-plug (18) on the Camera Fixing Angle.

**17. Coaxial Cable Clamp****18. F-plug (Refer to the ADSUTMENT on Page 7 for details)**

This plug is used to connect with the F-socket (16) on the camera head.

**19. Video Output Terminal**

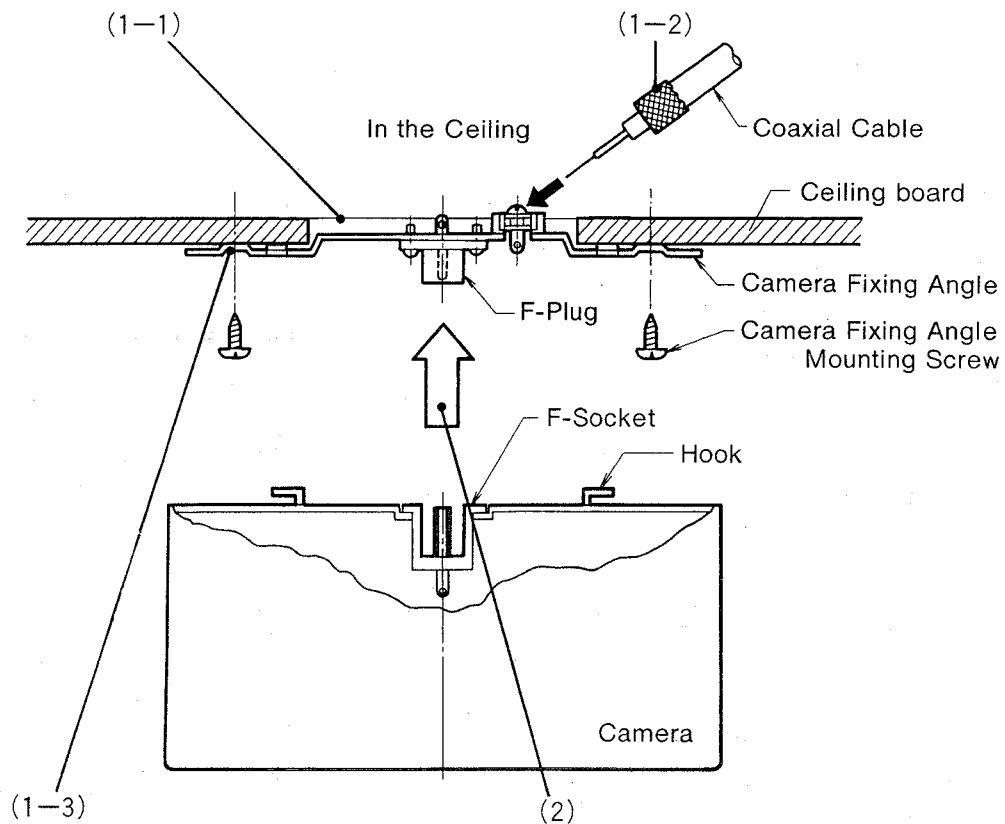
This terminal is used to connect the coaxial cable between the camera and the Camera Drive Unit WV-PS11A , Colour Video Monitor WV-CM110A or the equivalent.

**BLC (Back Light Compensation) Description**

When strong, unwanted background lighting interferes with the clarity of important scene objects, turn the BLC On/Off Switch (2) to the ON position.

Cautions : 1. Setting the BLC On / Off Switch to the "OFF" position is recommended when using a pan / tilt head or if the scene object has rapid changes in illumination, since the speed of lens iris becomes slow in the "ON" position.

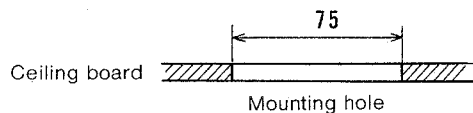
2. If the desired scene objects are not in the center of the picture, back light compensation may not work effectively.

**INSTALLATION**

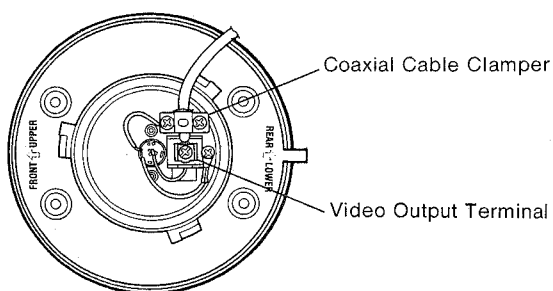
## INSTALLATION

### 1. Mounting the Camera Fixing Angle

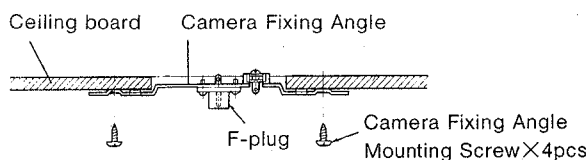
- 1-1. Make a hole (Diameter 75mm) in the ceiling board in the desired location.



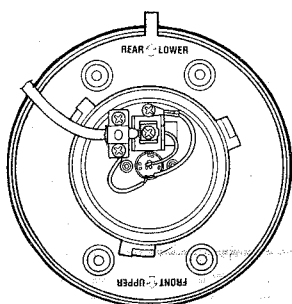
- 1-2. After completing the cable preparation, fix the coaxial cable to the Camera Fixing Angle.



- 1-3. Fix the Camera Fixing Angle onto the ceiling board by using four Camera Fixing Angle Mounting Screws.



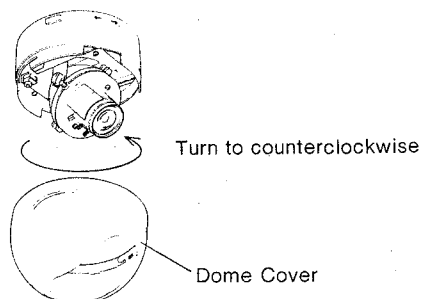
Note : 1. Match "↑" of the REAR ↑ LOWER / FRONT ↑ UPPER to the desired position.



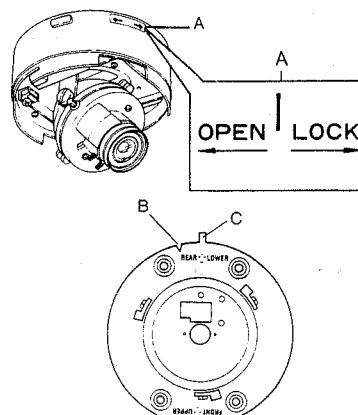
2. Use the optional Ceiling Mount Bracket WV-Q100A when the ceiling board cannot support camera.

### 2. Mounting the camera onto the Camera Fixing Angle (provided).

- 2-1. Remove the Dome Cover (13) from the camera by turning it counterclockwise.

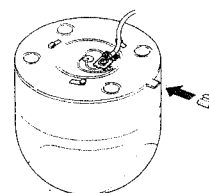


- 2-2. Match "A" on the camera to "B" of the Camera Fixing Angle and insert the camera into the Camera Fixing Angle.



- 2-3. Turn the camera toward the LOCK direction so that "A" is brought to the center of "C".

- 2-4. Set the Fall Prevention Cap (provided) to prevent the camera body from falling as shown below.



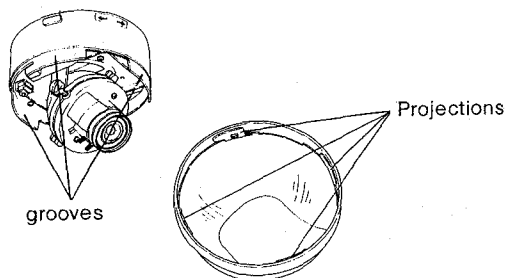
#### Remarks :

- (1) If the camera body is not installed correctly with Camera Fixing Angle, the Fall Prevention Cap cannot be set.
- (2) The camera body cannot be moved after the Fall Prevention Cap has been set.
- (3) Remove the camera body after the Fall Prevention Cap has been removed.

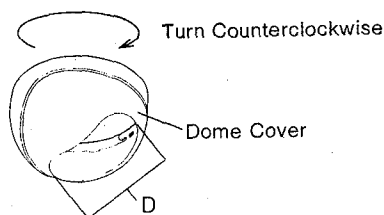
2-5. Adjust the camera angle to the desired position.

Refer to the Camera Angle Adjustment on page 5 for details.

2-6. Match four grooves on the camera to four projections of the Dome Cover.



2-7. Reattach the Dome Cover (13) to the camera by turning this cover clockwise so that the "D" position is in the front of the Camera Head.



## CONNECTION

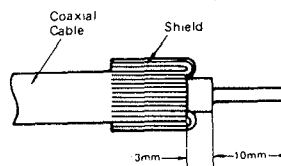
### Preparation :

These connections should be made only by qualified service personnel or system installers.

### Cable Information

Coaxial Cable (Connection for the Video Output Terminal (19) )

The maximum cable thickness for this camera is 5C-2V (RG-6/U) type.

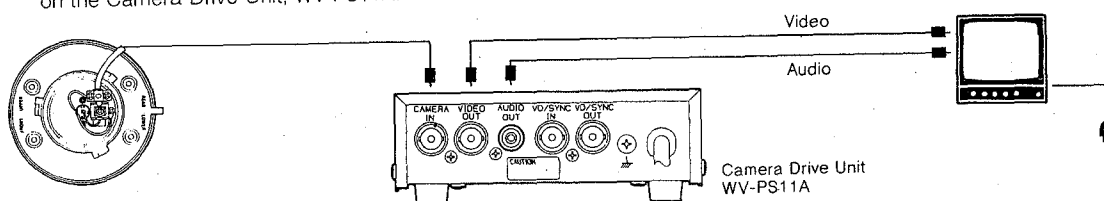


Note : When assembling the coaxial cable/BNC connector, follow connector manufacture's specific directions.

## SYSTEM CONNECTION

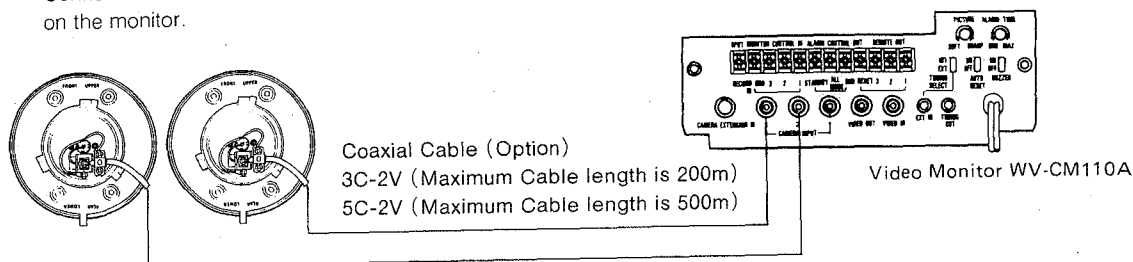
Connection with the optional Camera Drive Unit, WV-PS11A.

Connect a coaxial cable between the Video Output Terminal (19) on this camera and the Camera Input Connector on the Camera Drive Unit, WV-PS11A.



Connection with the optional monitor WV-CM110A

Connect a coaxial cable between the Video Output Terminal (19) on this camera and the Camera Input Connector on the monitor.

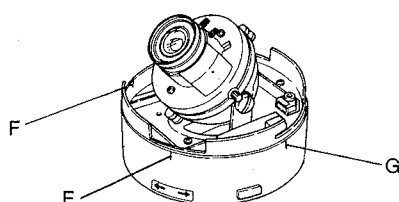


Coaxial Cable (Option)  
3C-2V (Maximum Cable length is 200m)  
5C-2V (Maximum Cable length is 500m)

## ADJUSTMENT

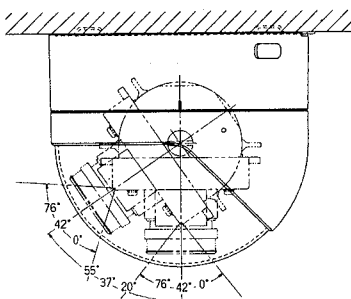
### 1. Panning

The "E" line on the Panning Table can move between the "F" and "G" lines.



### 2. Tilting of the camera

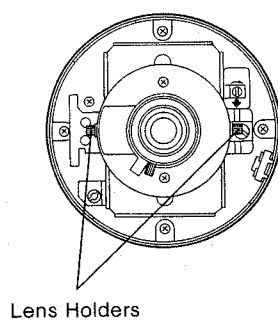
Tilting angle is shown below.



Note : The adjustment for picture tilt is normally required. (refer to the item 3 of ADJUSTMENT on page 5)

### 3. Picture Tilt

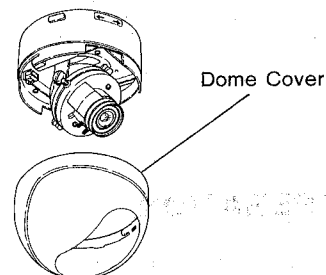
Loosen the two Lens Holders (12) and adjust the picture tilt by turning the Camera Head (9).



### 4. Focusing

Precaution :The focus adjustment should be done at the same time of the Camera Angle Adjustment.

4-1. Remove the Dome Cover (13) from the camera.  
(Refer to item 2-1 of INSTALLATION on Page 3)

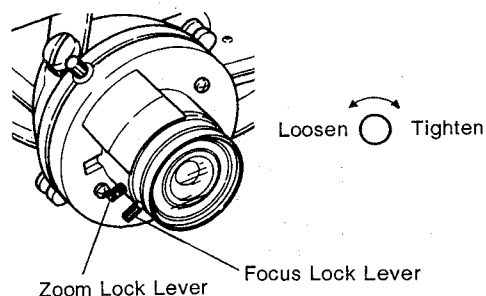


4-2. Loosen the Zoom Lock Lever.

4-3. Set the angular field of view according to the scene desired.

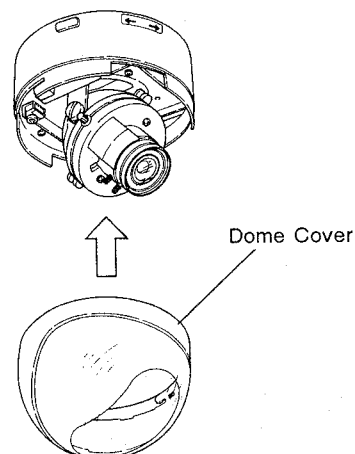
4-4. After setting the angular field of view, tighten the Zoom Lock Lever.

4-5. Loosen the Focus Lock Lever.



4-6. Set the correct focus by turning the Focus Ring (10).

4-7. After setting the correct focus, tighten the Focus Lock Lever.



### 5. Angular field of view and focus

By connecting the Video Output Jack (Diameter is 2.5mm) to the video input on a video monitor, local adjustment of angular field of view and / or focus is available while observing the picture.

Note : Be sure to use this jack only the purpose for adjustment of the angular field of view or focus.

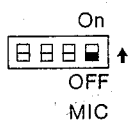
Do not use this jack for anyother purpose.

Other wise the noise on the screen will be obtained.

## OPERATION

By using the optional Camera Drive Unit, WV-PS11A, and Color Monitor, WV-CM1000, the sound from the camera can be monitored.

Set the Michrophone On / Off Switch (4) to the ON position.



Note : When the distance between the camera and speaker is too close, howling or feedback may occur.

In this case, turn the Audio Control (5) to counterclockwise (MIN direction) until the howling stops.



## About Your Computer

In order to run the E.V.R (Electric Variable Resistor) adjustment program your IBM-PC (PS2 or AT type) or compatible must meet the following requirements :

- The DOS Operating System must be 3.3 or higher.
- The Operating System must be 100% compatible with your computer.
- The memory in your IBM-PC must be at least 640K-bytes, and 512K-bytes shall be available to the E.V.R adjustment program.

## Installing E.V.R Adjustment Program

- The Example given here is for A 2 drive computer, your procedure might vary slightly depending on drive configuration.
- Formatting new disk and making a copy of DOS Operating System
  - a) Insert disk containing DOS operating system into your floppy drive (for example, drive A) and type **A :**
  - b) Insert new disk into your floppy drive (for example, drive B).
  - c) Format and make a copy of DOS operating system from your original disk to new disk by typing **FORMAT B : / S** and press **ENTER**.
  - d) Type **COPY ANSI. SYS B :** and press **ENTER**.
- Install E.V.R Adjustment Program onto formatted new disk with DOS operating system.
  - e) Take out original disk containing DOS operating system from your floppy drive (drive A) and insert disk containing E.V.R adjustment program into your floppy drive (drive A) and type **A :**
  - f) At the prompt, type **CD IBMPC** and press **ENTER**.
  - g) If required, type **COPY CONFIG. SYS B :** and press **ENTER**.
  - h) Type **CD PAL**.
  - i) Type **COPY ADJS. EXE B :** and press **ENTER**.
  - j) Type **CD \** and press **ENTER**.
  - k) Type **CD SEQ** and press **ENTER**.
  - l) Type **COPY CF20E. SEQ B :** and press **ENTER**.
  - m) Type **CD \** and press **ENTER**.
  - n) Type **CD EVR** and press **ENTER**.
  - o) Type **COPY CF20E. EVR B :** and press **ENTER**.
  - p) After completing installation of program, you are ready to use E.V.R adjustment program.

Note :

When completed the new disk should be a bootable disk which contains the following files :

1. COMMAND     COM
2. ANSI         SYS
3. CONFIG      SYS
4. ADJS         EXE
5. CF20E        SEQ
6. CF20E        EVR

## ADJUSTMENT PROCEDURE

### 1. Test Equipment Required

The following test equipments are required for adjustment.

- Oscilloscope (50 MHz band width, dual trace, delayed with three probes)
  - Vector scope
  - Frequency counter
  - Waveform monitor
  - Under scanned colour video monitor
  - Lighting (140 footcandles (1400 lux) 3200°K)
  - Lux meter
  - Colour temperature conversion filter (C12, C4)
- Refer following table for conversion filter.

|       |     |     |
|-------|-----|-----|
| KENKO | C4  | C12 |
| KODAK | 82C | 80B |

- Personal computer (IBM-PS2 type)
- Standard straight RS-232C cable
- Logarithmic gray scale chart (Part No. : YWV2310RB99)

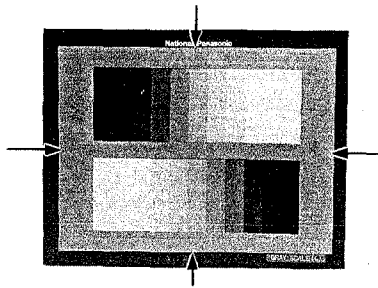


Fig. 1-1

- colour chip chart (Part No. : YWV2310RB98)

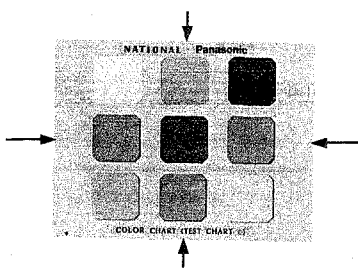


Fig. 1-2

- E.V.R Adjustment kit (YWV0E0182AN)

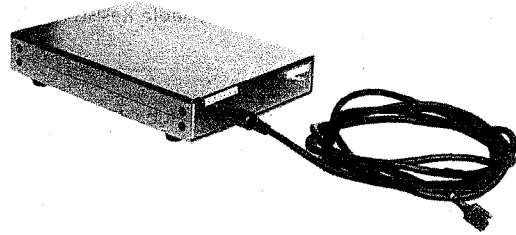


Fig. 1-3

### 2. Disassembling Procedure for Adjustment

- Turn the dome cover to counterclockwise and remove the dome cover. (Fig. 2-1)

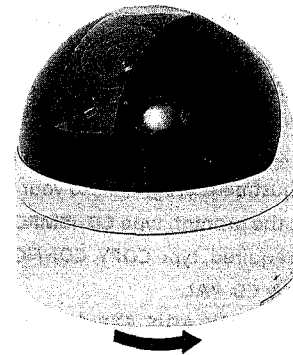


Fig. 2-1

- Remove two screws on the bracket holding camera head. (Fig. 2-2)

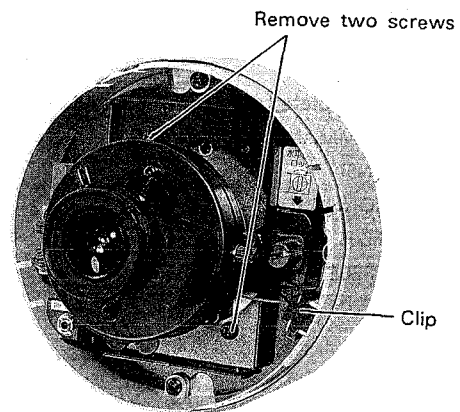


Fig. 2-2

- Pull the clip holding microphone unit and pick out microphone from the cover. (Fig. 2-2)

- Remove four screws on the cover as shown below. (Fig. 2-3)

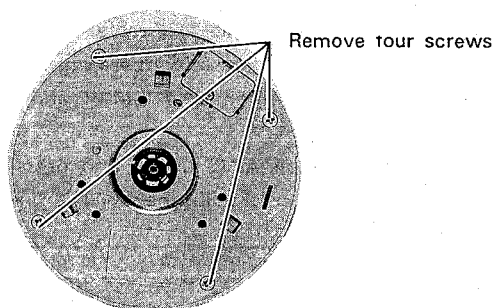


Fig. 2-3

- Remove the cover from the camera. (Fig. 2-4)

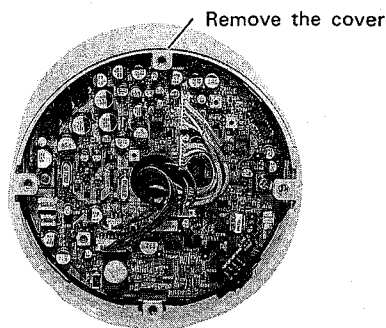


Fig. 2-4

### 3. Connection and Setting up for Adjustment

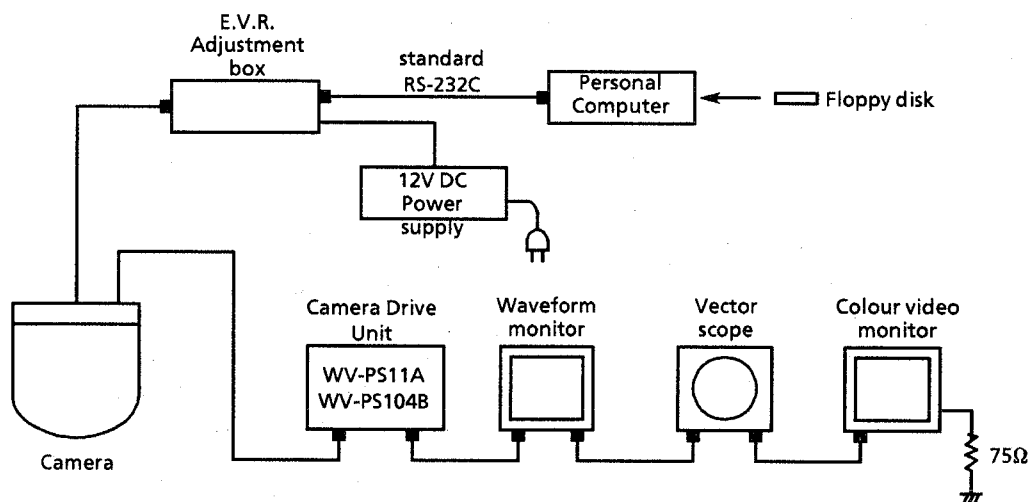


Fig. 3-1

- Connect Video Output Terminal on the Camera Fixing Angle of camera to CAMERA IN Connector of Camera Drive Unit using coaxial cable.
- Connect VIDEO OUT Connector of Camera Drive Unit to video monitor through waveform monitor and vectorscope using coaxial cable.
- Terminate colour video monitor with 75 ohms.

## 4. Adjustment Procedure

- Refer to page 24 for the Location of test points and adjusting control.

- Set the switches and controls position below.

AGC Switch : ON  
 Back Light Switch : OFF  
 Picture Detail Switch : SHARP  
 Microphone Switch : OFF  
 Audio Control : MAX  
 Auto Light Control : centre

### ■ Adjustment Procedure-1

#### (1)-1 Reset Bias adjustment

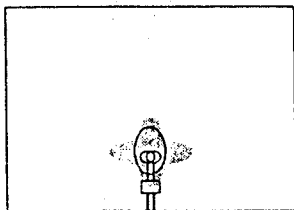
Test Point : Pin1 of CN2 (VIDEO OUT) Sensor board  
 Adjust : VR1 (Reset Bias) Sensor board

- Cap on the lens.
- Connect oscilloscope to pin1 of CN2 on Sensor board.
- Adjust VR1 to obtain a maximum pulse level.

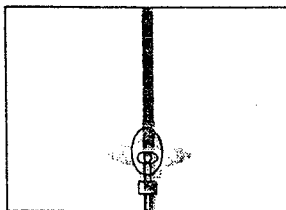
#### (1)-2 V.Sub Adjustment

Test Point : Monitor TV  
 Adjust : VR2 (V.Sub) Sensor board

- Aim the camera at the bright object such as 40-watts lamp.
- While observing the picture on the video monitor, adjust VR2 so that the blooming becomes minimum.



GOOD



NO GOOD

### ■ Adjustment Procedure-2 (E.V.R Adjustment)

- Connect E.V.R Adjustment box to CN7 on main board.
- Connect E.V.R Adjustment box to IBM-PC (Personal Computer) using standard RS-232C cable.
- Insert new disk containing DOS operating system and E.V.R Adjustment Program into IBM-PC and turns on power of IBM-PC
- At the prompt, type **ADJS CF20E** and press **ENTER**, following initial menu for adjustment will be displayed.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****MENU*****
2. 5VOLT ADJ                      15.(A).1.WB MANU OFFSET R
7.(A).LOW CLIP                    15.(A).2.WB MANU OFFSET R
7.(B).OB                          15.(B).1.WB ATW OFFSET R
8.(A-1).AGC OFF GAIN FOR ALC      15.(B).2.WB ATW OFFSET R
8.(A-2).AGC OFF GAIN FOR ALC      15.(C).1.WB ATW LIMIT Rch
8.(B).ALC DC                      15.(C).2.WB ATW LIMIT Bch
8.(C).TARGET2_IRIS FOR ALC        16.(A).1.3200K R_GAIN
8.(D).TARGET1_IRIS FOR ALC&BLC    16.(A).2.3200K R_GAIN
9.PEDESTAL                       16.(A).3.3200K PHASE
10.(A-1).Y LEVEL                  L-byte 16.(B).1.5100K R_GAIN
10.(A-2).Y LEVEL                  L-byte 16.(B).2.5100K R_GAIN
11.KNEE(1)                        L-byte 17.HIGHLIGHT CHROMA CLIP
11.KNEE(2)                        H-dyte 18..FM FREQUENCY
12.AGC ON(MAX GAIN)
13.1.BURST LEVEL
13.2.BURST PHASE
14.1.CARRIER Rch
14.2.CARRIER Bch
14.3.CARRIER Rch
14.4.CARRIER Bch
<CONTENTS> 5.00+-0.03
< INSTRUCTION > PLEASE CHOOSE MENU DATA BY ARROW-KEY
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Press **SAVE (F5)**. Then computer will ask you for the file name.
- Give appropriate file name to the computer. But do not use CF20E.EVR for your file name. This saving procedure is recommended to keep the current status of the camera.
- Press **LOAD (F1)** and type CF20E.EVR, and press **ENTER** for presetting adjustment of the camera.
- After finishing, the message **ERROR 14 SCK NG!** will be displayed, but this is normal (Not real NG).
- Press **ENTER** for starting adjustment.

#### NOTE :

- EEPROM mentioned in this adjustment procedure is IC19 on main board.
- RAM mentioned in this adjustment procedure is IC13 on main board.
- Some numbers of the following Adjustment Procedure-2 are missing due to matching the adjustment items with the EVR adjustment items.

## (2) +5V adjustment

Test Point : TP2 (+5V)

Main board

Adjust : RAM (D0)

- Press ENTER key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

2. 5Volt ADJ
5.00+-0.03

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0D0
<DATA> : 45 - 45
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Connect digital voltmeter to TP2 (+5V).
- Adjust data by **ARROW** keys so that voltage becomes  $+5.0V \pm 0.03V$ .
- Press **ENTER** key for next adjustment.

## (7)-A Low clip adjustment

Test Point : RAM (D2)

Adjust : EEPROM (42)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

7. (A).LOW CLIP
(AGC ON) MEASURE"20h"or"22h"

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 042
<DATA> : 5D - 5D
<MEASURE> : 20
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Adjust data by **ARROW** keys so that measure level becomes between 20 and 22.
- Press **ENTER** key.

## (7)-B OB adjustment

Test Point : RAM (D2)

Adjust : RAM (BF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

7. (B).OB
MEASURE"20h"or"22h"

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0BF
<DATA> : 12 - 12
<MEASURE> : 20
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Adjust data by **ARROW** keys so that measure level becomes between 20 and 22.
- Repeat adjustment (7)-A and (7)-B until both measure levels become between 20 and 22.
- Press **ENTER** key.

## (8)-A AGC OFF gain adjustment

Test Point : Pin 1 (CDS OUT) of CN4 Main board

Pin 3 (AGC OUT) of CN4 Main board

Adjust : RAM (E5)

RAM (C0)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

8. (A-1).AGC OFF GAIN FOR ALC

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0E5
<DATA> : 83 - 83
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Adjust data by **ARROW** keys so that measure level becomes between 20 and 22.
- Press **ENTER** key.

- Connect oscilloscope to pin 1 (CDS OUT) of CN4 on Main board.
- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that CDS output signal at pin 1 of CN4 becomes 300 mV as shown in Fig. 4-1.

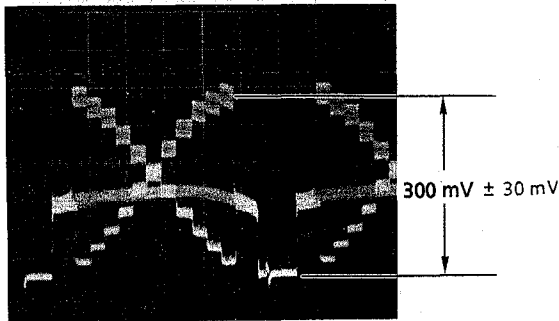


Fig. 4-1

- Press **ENTER** key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
.....EVR.....

8.(A-2).AGC OFF GAIN FOR ALC

.....
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0C0
<DATA> : 62 - 62
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)
  
```

- Change oscilloscope from pin 1 of CN4 to pin 3 of CN4.
- Adjust data by **ARROW** keys so that signal level becomes 400 mV ± 30 mV as shown in Fig. 4-2.

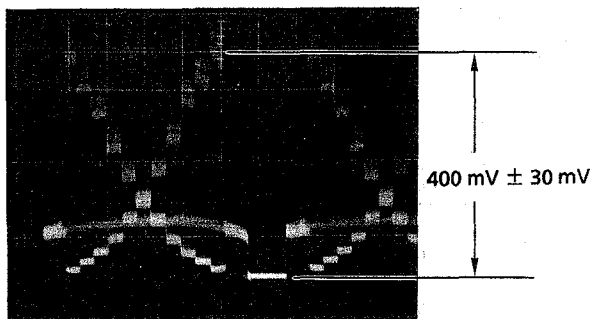


Fig. 4-2

- Repeat adjustment (8)-A-1 and (8)-A-2 until AGC output signal at pin 3 of CN4 becomes 400 mV ± 30 mV.
- Press **ENTER** key.

## (8)-B ALC DC adjustment

Test Point : RAM (D5)

Adjust : RAM (C2)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
.....EVR.....

8.(B).ALC DC

.....
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0C2
<DATA> : 91 - 91
<MEASURE> : 05
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)
  
```

- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that measure level becomes between 03 and 04.
- Press **ENTER** key.

## (8)-C BLC preset OFF (Target 2 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CN4 Main board

Adjust : RAM (E5)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
.....EVR.....

8.(C).TARGET2_IRIS FOR ALC

.....
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0E5
<DATA> : 83 - 83
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)
  
```

- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CN4.
- Adjust data by **ARROW** keys so that signal level becomes 300 mV ± 30 mV as shown in Fig. 4-3.

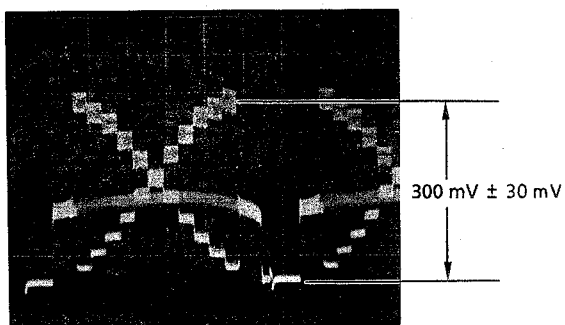


Fig. 4-3

- Press ENTER key.

#### (8)-D BLC preset ON (Target 1 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CN4 Main board  
Adjust : RAM (F0)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
.....EVR.....

8.(D).TARGET1_IRIS FOR ALC&BLC

.....
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0F0
<DATA> : 41 - 41
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CN4.
- Adjust data by **ARROW** keys so that signal level becomes  $300\text{ mV} \pm 30\text{ mV}$  as shown in Fig. 4-4.

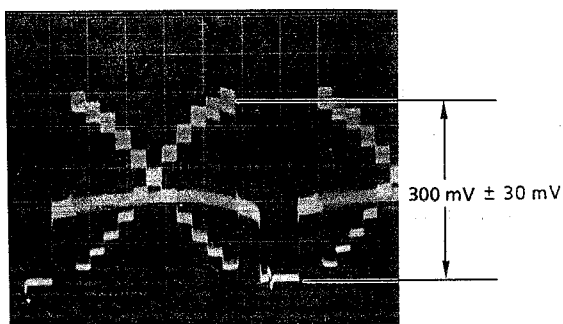


Fig. 4-4

- Press ENTER key.

#### (9) Pedestal adjustment

Test Point : VIDEO OUT connector Camera Drive Unit  
Adjust : RAM (CC)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
.....EVR.....

9.PEDESTAL

.....
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0CC
<DATA> : 02 - 02
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Connect waveform monitor or terminate oscilloscope to VIDEO OUT connector on Camera Drive Unit.
- Adjust data by **ARROW** keys so that signal level becomes  $50\text{ mV} \pm 5\text{ mV}$  as shown in Fig. 4-5.

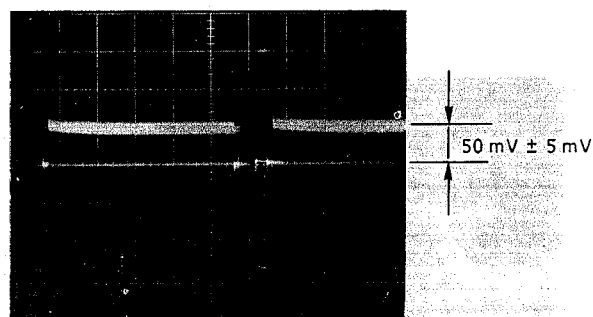


Fig. 4-5

- Press ENTER key.

## (10)-A Y. level adjustment

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : RAM (F8)

RAM (F9)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

10.(A-1).Y LEVEL      L-byte

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0F8
<DATA> : D7 - D7
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminate oscilloscope to VIDEO OUT connector on Camera Drive Unit.
- Adjust data by **ARROW** keys so that signal level becomes  $700\text{ mV} \pm 98\text{ mV}$  ( $98 \pm 7\text{ IRE}$ ) as shown in Fig. 4-6.

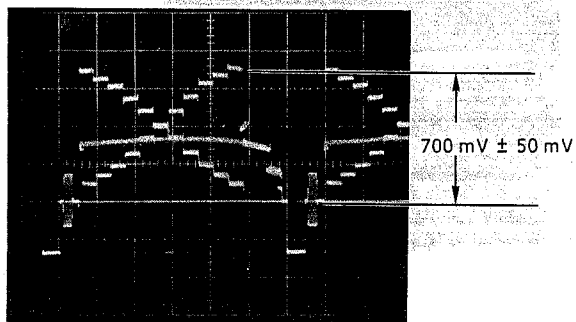


Fig. 4-6

- Press **ENTER** key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

10.(A-2).Y LEVEL      H-byte

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0F9
<DATA> : 00 - 00
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUT connector on Camera Drive Unit.
- Adjust data by **ARROW** keys so that signal level becomes  $700\text{ mV} \pm 50\text{ mV}$  ( $98 \pm 7\text{ IRE}$ ) as shown in Fig. 4-6.
- Repeat adjustment (10)-A-1 and (10)-A-2 until signal level becomes  $700\text{ mV} \pm 50\text{ mV}$  ( $98 \pm 7\text{ IRE}$ ).
- Press **ENTER** key.

## (11) Knee level adjustment

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : RAM (6E)

RAM (6F)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

11.KNEE(1)            L-byte

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 06E
<DATA> : 00 - 00
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminate oscilloscope to VIDEO OUT connector on Camera Drive Unit
- Adjust data by **ARROW** keys so that signal level becomes  $840\text{mV} \pm 35\text{mV}$  ( $117 \pm 5$  IRE) as shown in Fig. 4-7.

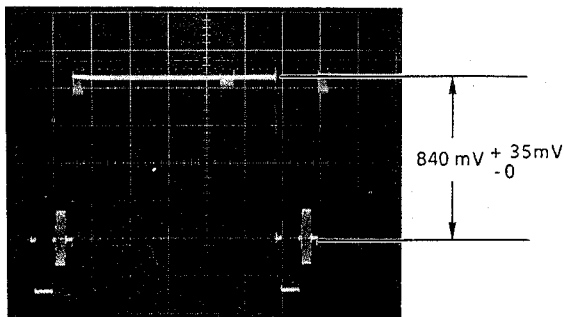


Fig. 4-7

- Press **ENTER** key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

11.KNEE(2)          H-dyte

<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 06F
<DATA> : 00 - 00
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUT connector on Camera Drive Unit.
- Adjust data by **ARROW** keys so that signal level becomes  $840\text{mV} \pm 35\text{mV}$  ( $117 \pm 5$  IRE) as shown in Fig. 4-7.
- Press **ENTER** key.

## (12) AGC ON (Max gain) adjustment

Test Point : VIDEO OUT connector    Camera Drive Unit  
Adjust :    RAM (187)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

12.AGC ON(MAX GAIN)

<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 187
<DATA> : A0 - A0
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Change lighting from 1400 lux to 3 lux.
- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that signal level becomes  $280\text{ mV} \pm 35\text{ mV}$  ( $39.2 \pm 4.9$  IRE).

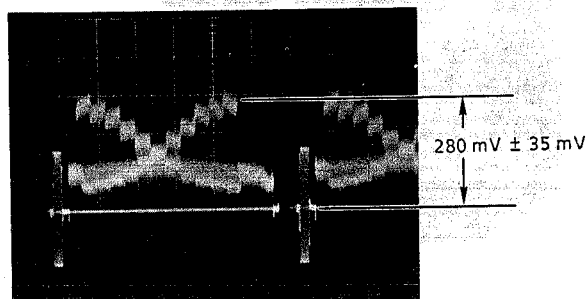


Fig. 4-8

- change lighting from 3 lux to 1400 lux.
- Press **ENTER** key.

## (13)-1 Burst level adjustment

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : EEPROM (3C)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****

13.1.BURST LEVEL

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 03C
<DATA> : 70 - 70
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN : PREVIOUS ITEM
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that burst level becomes  $300\text{ mV} \pm 10\text{ mV}$  ( $42 \pm 1.4\text{ IRE}$ ) as shown in Fig. 4-9.

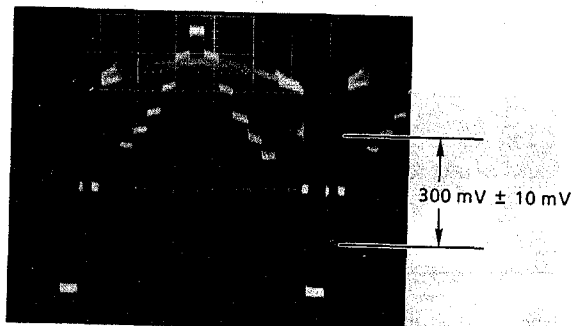


Fig. 4-9

- Press ENTER key.

## (13)-2 Burst phase adjustment

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : EEPROM (3E)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****

13.2.BURST PHASE

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 03E
<DATA> : 30 - 30
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN : PREVIOUS ITEM
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that burst phase becomes  $135^\circ$ .

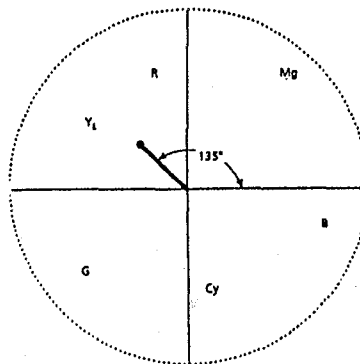


Fig. 4-10

- Press ENTER key.

**(14) R. B carrier balance adjustment**

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : EEPROM (43)

EEPROM (45)

- Set the gain of vectorscope to maximum.

**(14)-1 R. Carrier balance adjustment (AGC-OFF)**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

14.1.CARRIER Rch
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 043
<DATA> : 5A - 5A
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.

**(14)-2 B. Carrier balance adjustment (AGC-OFF)**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

14.2.CARRIER Bch
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 045
<DATA> : 5D - 5D
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the centre of vectorscope, press **PG DN** key twice to return to (14)-1, and repeat above procedure until vector positions at the centre of vectorscope as shown in Fig. 4-11.

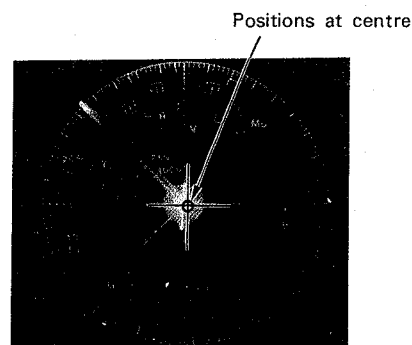


Fig. 4-11

**(14)-3 R. Carrier balance adjustment (AGC-ON)**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

14.3.CARRIER Rch
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 043
<DATA> : 5A - 5A
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.

## (14)-4 B. Carrier balance adjustment (AGC-O N)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

14.4.CARRIER Bch
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 045
<DATA> : 5D - 5D
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the centre of vectorscope, press **PG DN** key twice to return to (14)-3, and repeat above procedure until vector positions at the centre of vectorscope as shown in Fig. 4-12.

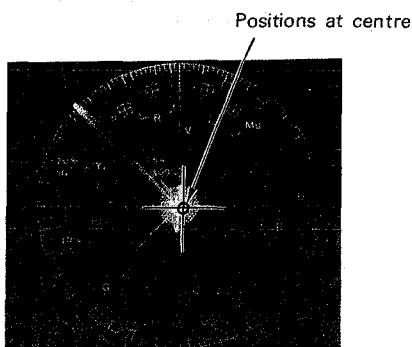


Fig. 4-12

## (15)-A White balance manual offset adjustment

Test point : VIDEO OUT connector Camera Drive Unit

Adjust : RAM (8C)  
RAM (8D)

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

## (15)-A-1 R. White balance manual offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

15.(A).1.WB MANU OFFSET R

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08C
<DATA> : 78 - 78
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.

## (15)-A-2 B. White balance manual offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

15.(A).2.WB MANU OFFSET B

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08D
<DATA> : 8F - 8F
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the centre of vectorscope, press **PG DN** key twice to return to (15)-A-1, and repeat above procedure until vector positions at the centre of vectorscope as shown in Fig. 4-13.

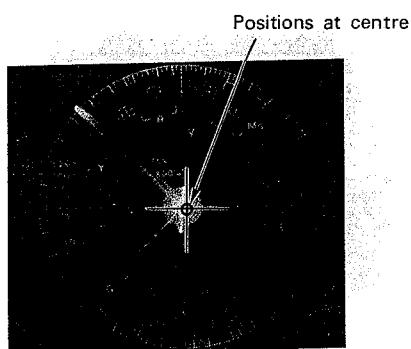


Fig. 4-13

**(15)-B ATW offset adjustment**

Test point : VIDEO OUT connector Camera Drive Unit

Adjust : EEPROM (40)

EEPROM (41)

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

**(15)-B-1 ATW offset adjustment**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

15.(B).1.WB ATW OFFSET R

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 040
<DATA> : 5B - 5B
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.

**(15)-B-2 B. ATW offset adjustment**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

15.(B).2.WB ATW OFFSET B

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 041
<DATA> : 5A - 5A
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the centre of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the centre of vectorscope, press **PG DN** key twice to return to (15)-B-1, and repeat above procedure until vector positions at the centre of vectorscope as shown in Fig. 4-14.

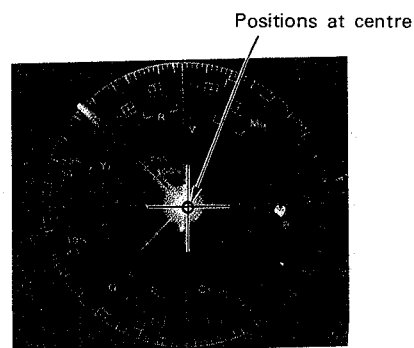


Fig. 4-14

**(15)-C ATW limit adjustment**

Test point : VIDEO OUT connector Camera Drive Unit

Adjust : RAM (8A)

RAM (8B)

- Aim the camera at white chart.
- Set CC filter (C12 + C4) on the lens to convert from 3200°K to 6500°K.

**(15)-C-1 R. ATW offset adjustment**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

15.(C).1.WB ATW LIMIT Rch

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08A
<DATA> : 3A - 3A
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector shifts 10% (Burst=100%) to Cyan side on vectorscope as shown in Fig. 4-15.
- Press **ENTER** key.

**(15)-C-2 B. ATW offset adjustment**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

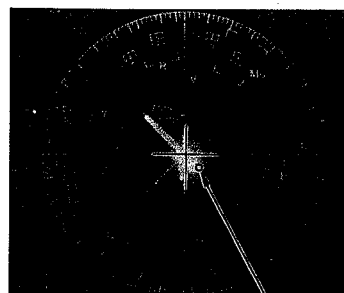
15.(C).2.WB ATW LIMIT Bch

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08B
<DATA> : 2D - 2D
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector shifts 10% (Burst=100%) to Cyan side on vectorscope.
- Press **ENTER** key.
- If the vector does not shift 10% (Burst =100%) to cyan side on vectorscope, press PG DN key twice to return to (15)-C-1, and repeat above procedure until vector shifts 10% to cyan side on vectorscope as shown in Fig. 4-15.



Shifted approx. 10%

Fig. 4-15

- Remove CC filter from in front of lens.

**(16)-A White balance manual offset adjustment (3200°K)**

Test Point : VIDEO OUT connector Camera Drive Unit

Adjust : RAM (8E)

RAM (8F)

RAM (186)

- Aim the camera at white chart.
- Set the gain of vectorscope to 75% position.

**(16)-A-1 R. Gain adjustment**

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

16.(A).1.3200K R_GAIN

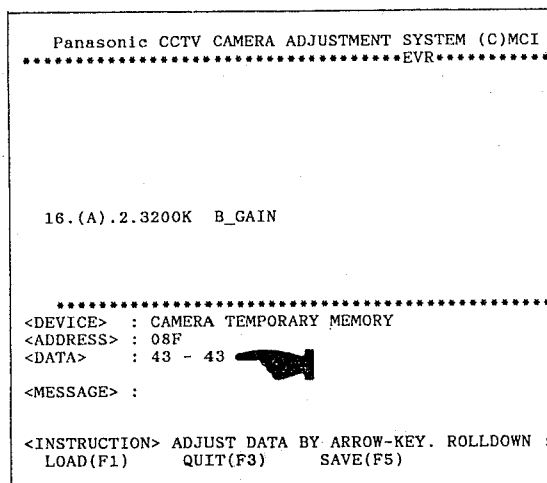
*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08E
<DATA> : 39 - 39
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) QUIT(F3) SAVE(F5)

```

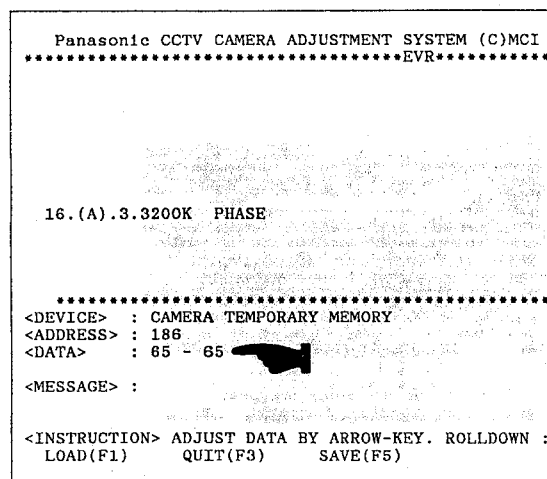
- Adjust data by **ARROW** keys so that red gain becomes 200 ± 5% (Burst=100%).
- Press **ENTER** key.

# (16)-A-2 B. Gain adjustment



- Adjust data by **ARROW** keys so that yellow gain becomes  $100 \pm 5\%$  (Burst=100%).
- Press **ENTER** key.

# (16)-A-3 Chroma phase adjustment



- Adjust data by **ARROW** keys so that both red vectors match ( $0 \pm 1^\circ$ ).
- Press **ENTER** key.
- If the chrominance phase and gain should not be adjusted to proper position, press **PG DN** key 3 times to return to (16)-A-1, and repeat above procedure until they are adjusted to proper position as shown in table-1.

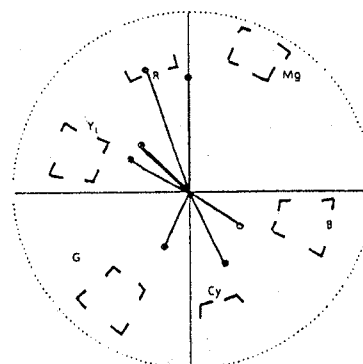


Fig. 4-16

|       | Red               | Yellow            |
|-------|-------------------|-------------------|
| Phase | $104 \pm 2^\circ$ | $157 \pm 5^\circ$ |
| Gain  | $200 \pm 5\%$     | $100 \pm 5\%$     |

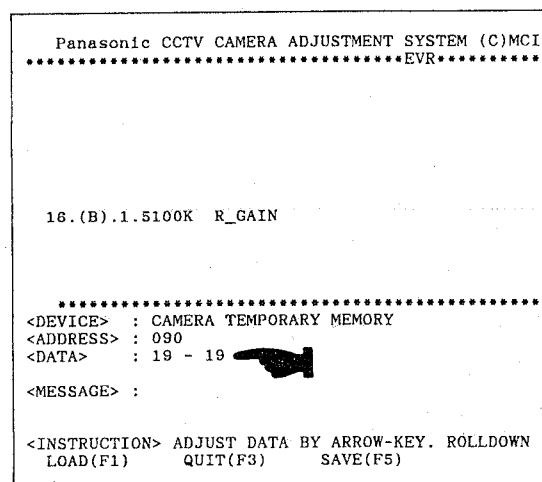
Table-1

# (16)-B White balance adjustment (5100°K)

Test point : VIDEO OUT connector Camera Drive Unit  
Adjust : RAM (90)  
RAM (91)

- Aim the camera at colour chip chart.
- Set CC filter (C12) on the lens to convert from 3200°K to 5100°K.

# (16)-B-1 Gain adjustment



- Adjust data by **ARROW** keys so that red gain becomes  $200 \pm 5\%$  (Burst=100%).
- Press **ENTER** key.

## (16)-B-2 B. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

16.(B).2.5100K B_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 091
<DATA> : 3C - 3C
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Adjust data by ARROW keys so that yellow gain becomes  $90 \pm 5\%$  (Burst=100%).
- Press ENTER key.
- If the chrominance gain and phase should not be adjusted to proper position, press PG DN key twice to return to (16)-B-1, and repeat above procedure until they are adjusted to proper position as shown in table 2.

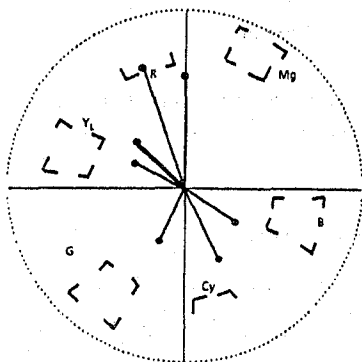


Fig. 4-17

|       | Red               | Yellow            |
|-------|-------------------|-------------------|
| Phase | $104 \pm 2^\circ$ | $157 \pm 5^\circ$ |
| Gain  | $200 \pm 5\%$     | $90 \pm 5\%$      |

Table-2

- Remove CC filter (C12) from in front of lens.

## (17) Highlight chroma clipa

Test Point : VIDEO OUT connector Camera Drive Unit  
Adjust : RAM (AA)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

17.HIGHLIGHT CHROMA CLIP
SET "DATA(ADJUSTED)-05h(MARGIN)"

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0AA
<DATA> : D0 - D0
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1)      QUIT(F3)      SAVE(F5)

```

- Aim the camera at white chart.
- Adjust data by ARROW keys so that chrominance level becomes minimum, and note this data as (a).
- Re-adjust data by ARROW keys so that data becomes (b).  
(a)-05h=(b)

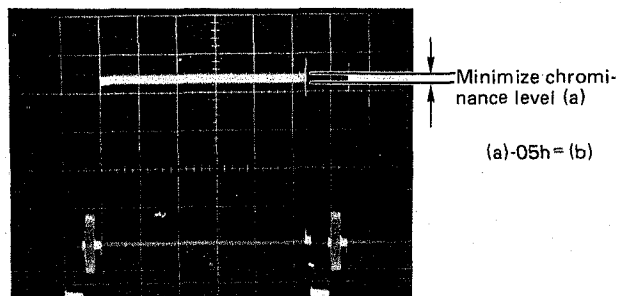


Fig-4-18

**(18) Audio Frequency Adjustment**

Test Point : TP1                      Main board  
Adjust :    EEPROM (AA)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVR*****

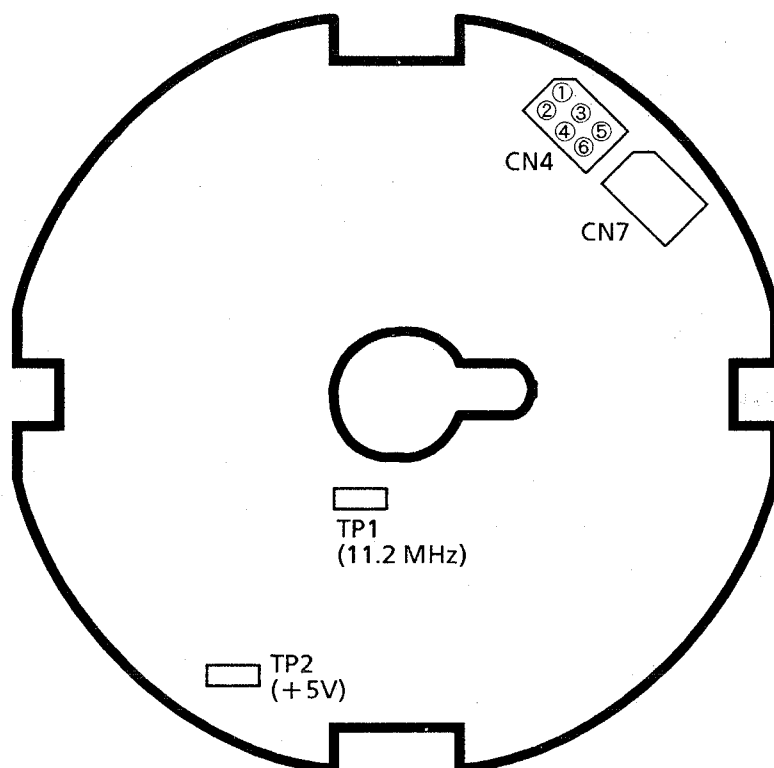
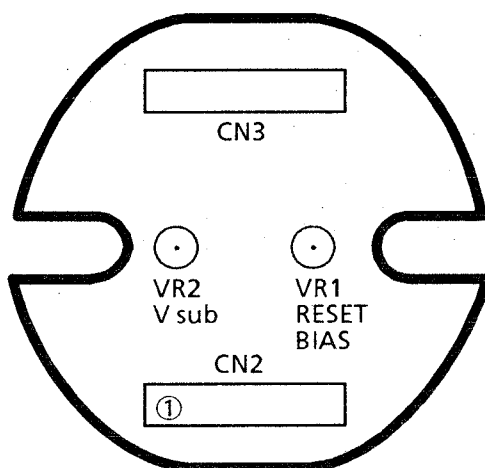
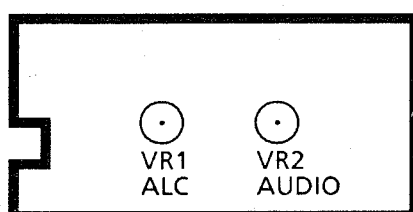
18..FM FREQUENCY
MEASURE"11.200

*****
<DEVICE> : CAMERA MEMORY(EEPROM)
<ADDRESS> : 044
<DATA> : 69 - 69
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLDOWN :
LOAD(F1) . QUIT(F3) SAVE(F5)

```

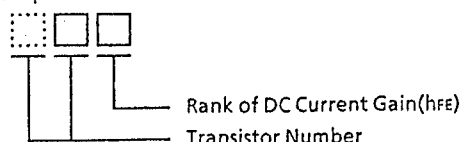
- Confirm that lens iris closes.
  - Set microphone switch to ON position.
  - Connect Frequency counter to TP1 on Main board.
  - Adjust data by ARROW key so that frequency becomes 11.2000 MHz  $\pm$  5 KHz.
  - Press ENTER key.
  - Set microphone switch to OFF position.
- 
- After finishing adjustment, press QUIT (F3).
  - Press N and ENTER to finish
  - Disconnect cable from CN7 on Main board.

**LOCATION OF TEST POINTS AND ADJUSTING CONTROLS****MAIN BOARD (Component Side)****SENSOR BOARD (Component Side)****VR BOARD (Component Side)**

## CHIP COMPONENTS

### 1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.



Transistor Number

(Chip Transistor)

| Letter | Transistor No. | Letter | Transistor No. |
|--------|----------------|--------|----------------|
| A      | 2SB709         | X      | 2SD602A        |
| B      | 2SB709A        | Y      | 2SD601         |
| C      | 2SB710         | Z      | 2SD601A        |
| D      | 2SB710A        | 1A     | 2SB799         |
| E      | 2SA1022        | 1B     | 2SB814         |
| F      | 2SA1034        | 1C     | 2SB902         |
| H      | 2SA1035        | 1F     | 2SK321         |
| I      | 2SB792         | 1K     | 2SK316         |
| K      | 2SC2778        | 1L     | 2SK247         |
| P      | 2SD814         | 1M     | 2SJ84          |
| Q      | 2SD813         | 1N     | 2SK199         |
| R      | 2SC2480        | 1O     | 2SK198         |
| S      | 2SC2405        | 1T     | 2SC3077        |
| T      | 2SC2406        | 1X     | 2SC2845        |
| U      | 2SC2404        | 1Z     | 2SD1030        |
| V      | 2SC2295        | 2B     | 2SK374         |
| W      | 2SD602         | 2C     | 2SK116         |

(Small Chip Transistor)

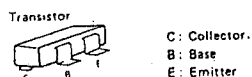
| Letter | Transistor No. |
|--------|----------------|
| A      | 2SB1218        |
| U      | 2SC3931        |
| W      | 2SD1820        |
| Y      | 2SD1819        |
| E3     | 2SA1226        |
| OS     | 2SB1219        |
| UC     | 2SA1532        |
| YU     | 2SC3938        |

(Pair Transistor)

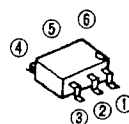
| Letter | Transistor No. |
|--------|----------------|
| 5C     | XN4601         |
| 5N     | XN6501         |
| 5O     | XN6401         |

Example : WQ → 2SD602 - Q  
YQ → 2SD601 - Q  
1BS → 2SB814 - S

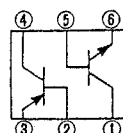
Appearance and Symbols



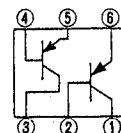
|               | 1     | 2      | 3      |
|---------------|-------|--------|--------|
| Except 2SK199 | Drain | Source | Gate   |
| 2SK199        | Gate  | Drain  | Source |



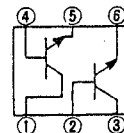
XN4601



XN6401

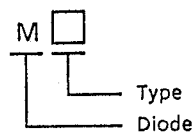


XN6501



### 2. Chip Diode

The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

| Letter | Diode No. | Letter | Diode No. |
|--------|-----------|--------|-----------|
| MA     | MA151A    | MI     | MA152K    |
| MB     | MA152A    | MK     | MA28W-B   |
| MC     | MA153     | ML     | MA28T-A   |
| MD     | MA28-A    | MN     | MA151WA   |
| ME     | MA28-B    | MO     | MA152WA   |
| MF     | MA28W-A   | MT     | MA151WK   |
| MH     | MA151K    | MU     | MA152WK   |

Appearance and Symbols

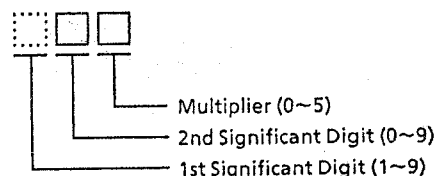


Anode → Cathode

|                  | 1       | 2       | 3       |
|------------------|---------|---------|---------|
| MA28/MA28W/MA28T | -       | Anode   | Cathode |
| MA151K/MA152K    | -       | Anode   | Cathode |
| MA151A/MA152A    | -       | Cathode | Anode   |
| MA151WK/MA152WK  | Anode   | Anode   | Cathode |
| MA151WA/MA152WA  | Cathode | Cathode | Anode   |
| MA153            | Cathode | Anode   | Common  |

### 3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



Example : 330 →  $33 \times 10^0 = 33 \text{ ohms}$   
561 →  $56 \times 10^1 = 560 \text{ ohms}$   
123 →  $12 \times 10^3 = 12 \text{ ohms}$

Note: Zero ohm resistor (jumper chip) is colored red or green.

#### 4. Chip Capacitor

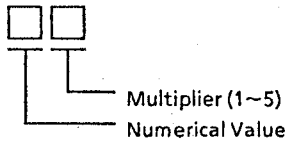
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

Example :

|     |   |         |     |   |        |
|-----|---|---------|-----|---|--------|
| 0.5 | → | 0.5 pF  | 2.5 | → | 2.5 pF |
| 75  | → | 0.75 pF | 33  | → | 33 pF  |
| 1   | → | 1 pF    | 82  | → | 82 pF  |

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

| Letter | Value | Letter | Value |
|--------|-------|--------|-------|
| A      | 10    | N      | 33    |
| B      | 11    | P      | 36    |
| C      | 12    | O      | 39    |
| D      | 13    | R      | 43    |
| E      | 15    | S      | 47    |
| F      | 16    | T      | 51    |
| G      | 18    | U      | 56    |
| H      | 20    | V      | 62    |
| J      | 22    | W      | 68    |
| K      | 24    | X      | 75    |
| L      | 27    | Y      | 82    |
| M      | 30    | Z      | 91    |

\*Letters I and O are not used

Example :

|    |   |                                     |
|----|---|-------------------------------------|
| A1 | → | $10 \times 10^1 = 100 \text{ pF}$   |
| N2 | → | $33 \times 10^2 = 3300 \text{ pF}$  |
| S3 | → | $47 \times 10^3 = 47000 \text{ pF}$ |

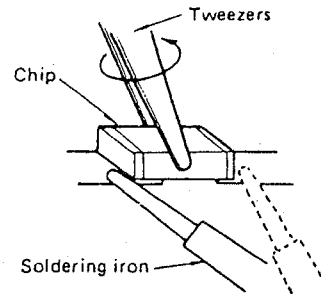
#### 5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

#### 5-1 Removal (Transistor, Diode, Resistor and Capacitor)

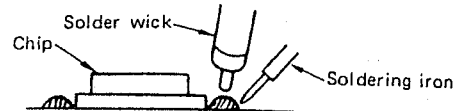
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.

Note : Be careful not to damage other chips.

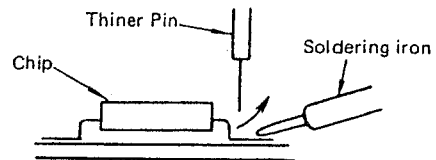


#### 5-2 Removal (IC)

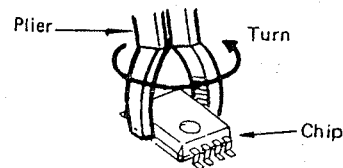
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thinner pin.

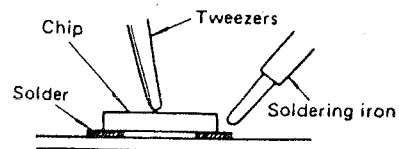


3. Remove IC turning it with plier.

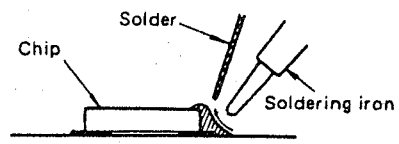


#### 5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

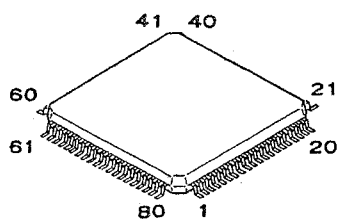


3. Solder both ends of chip (three leads for chip transistor).

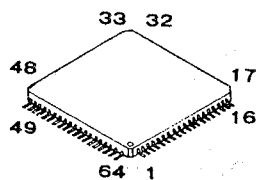


# APPEARANCE OF IC, TRANSISTOR AND DIODE

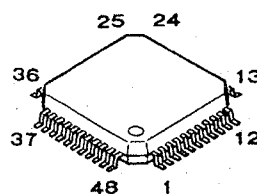
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MN6732  
MN73093



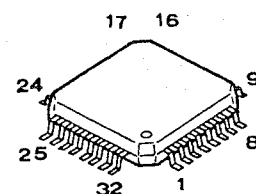
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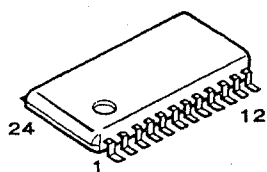
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MN3111H  
MN657011H  
YWPC5022G079



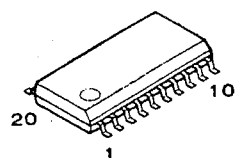
AN2030FAP



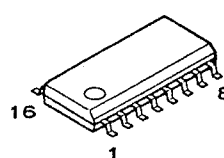
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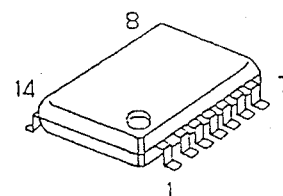
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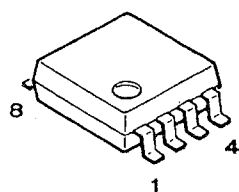
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AN2040SB



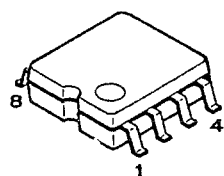
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YWTC74AT04F



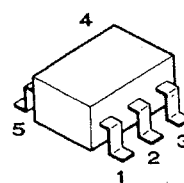
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YWCXA1439M  
YWNJM3416



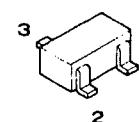
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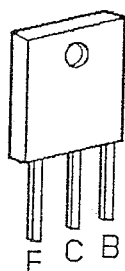
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YWTC7S04F



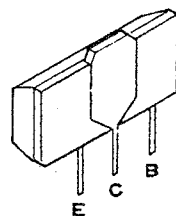
MN13821



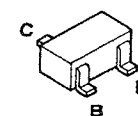
2SC1568-RST



2SB766A-QR



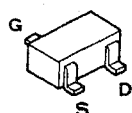
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2SA1576  
2SC4619  
2SB1462



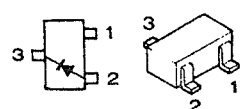
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2SC4618  
2SB1218A-QR

2SD1820-QRS  
2SD2216  
2SD1819-QRS

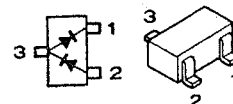
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2SK853



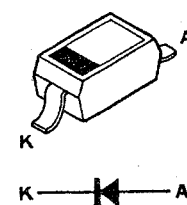
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MA141K  
YWDA121  
YWRD6R2MB1

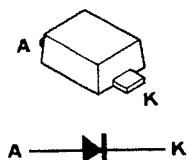


MA143  
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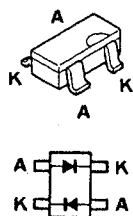
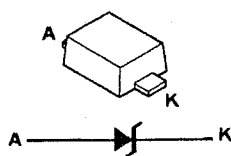


MA338  
MA372

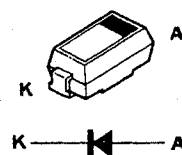


**APPEARANCE OF IC, TRANSISTOR AND DIODE**MA728  
MA729

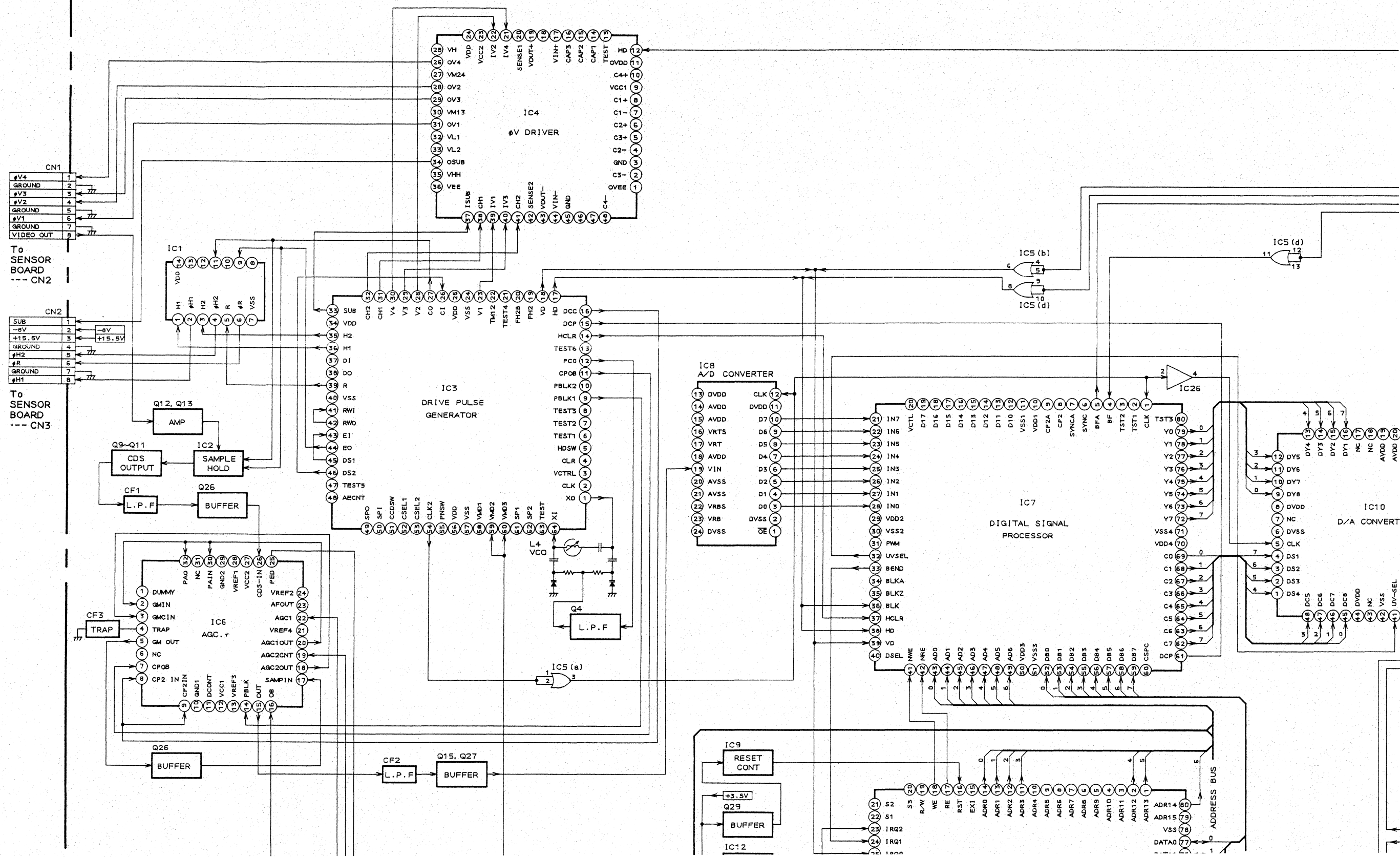
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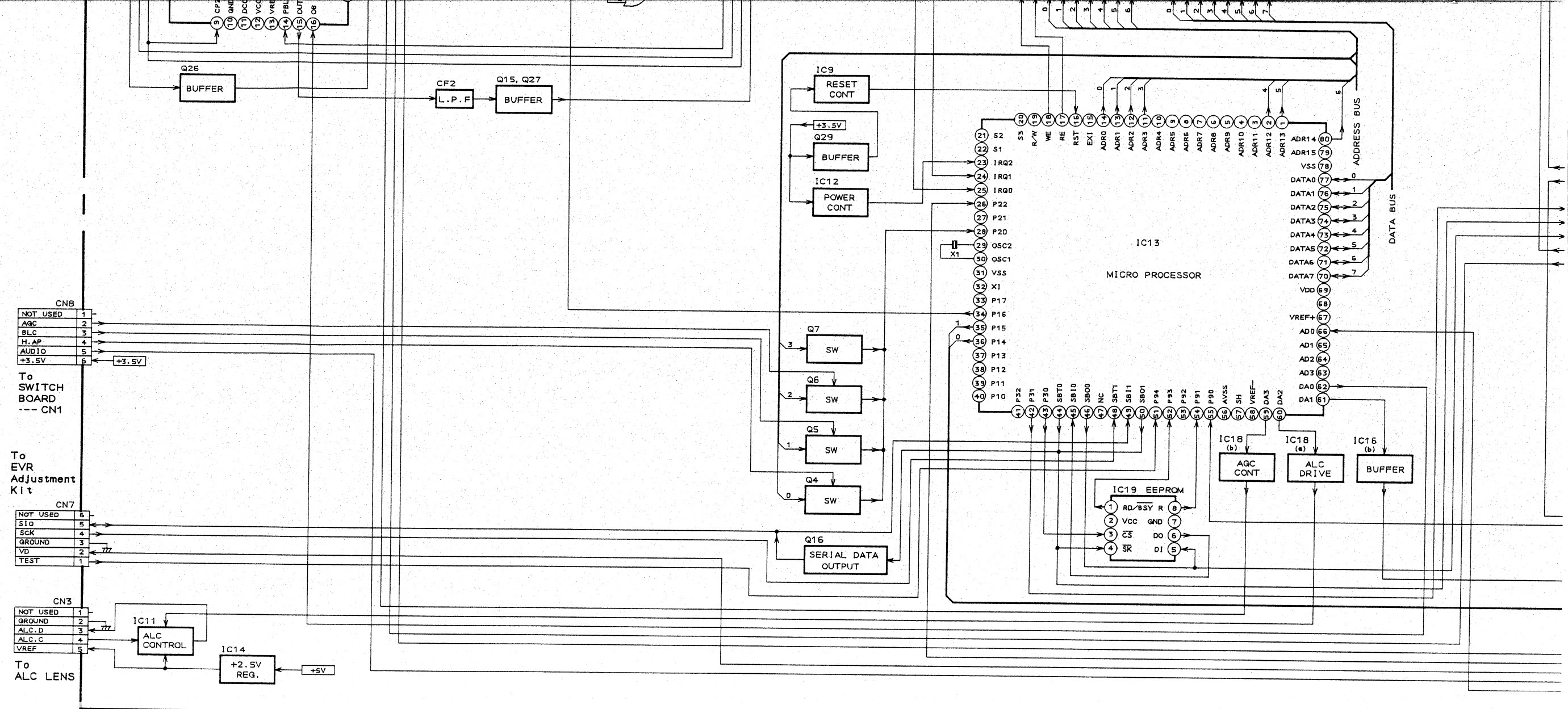
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MA8100  
MA8150

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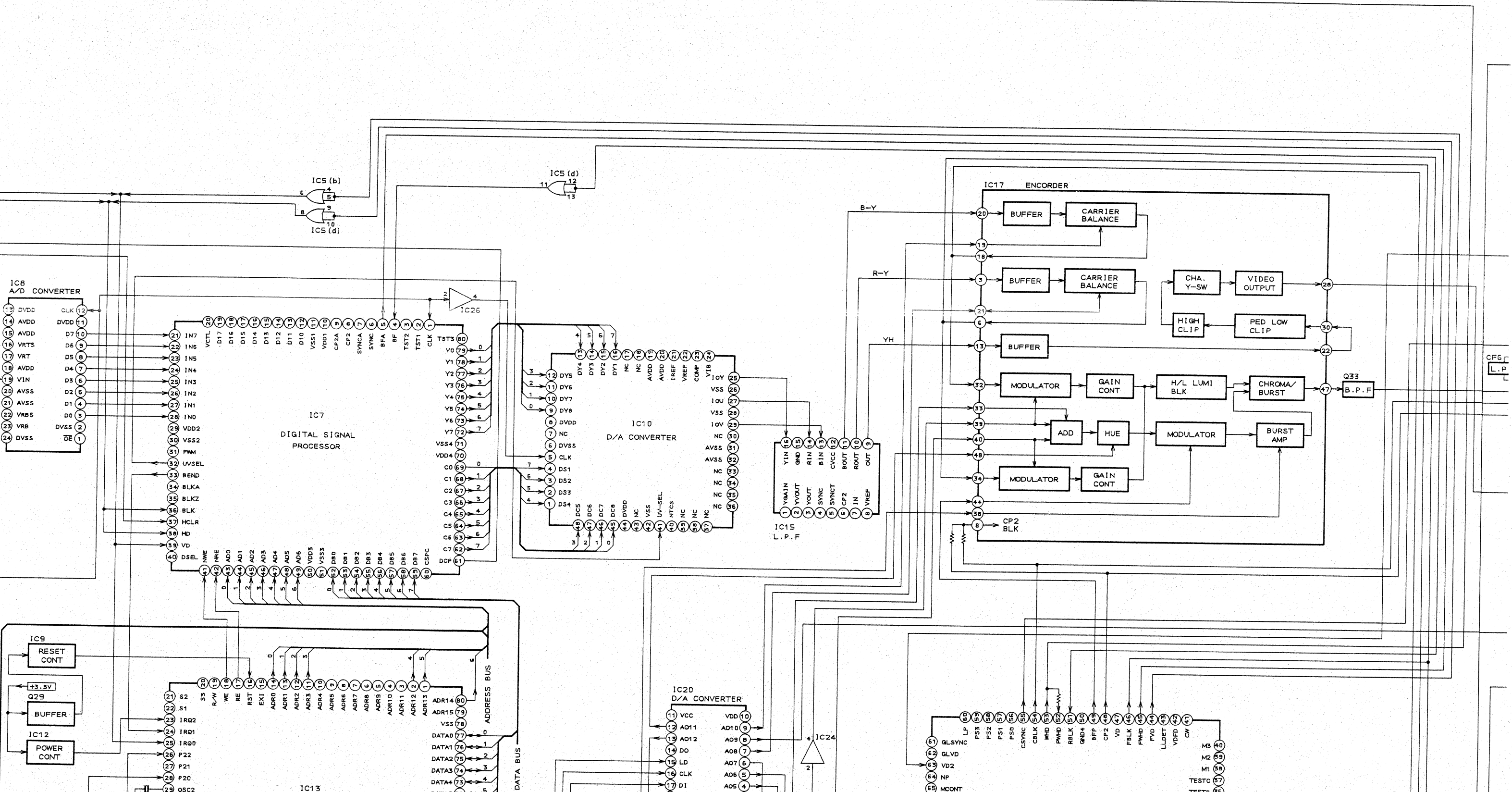


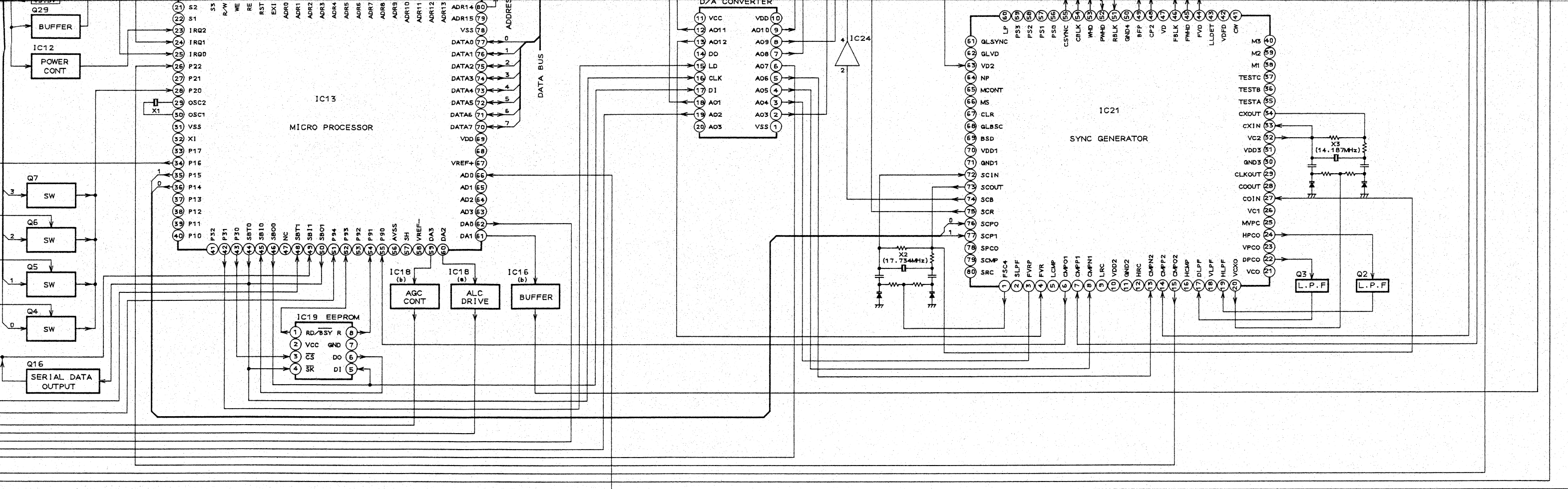
## MAIN BOARD

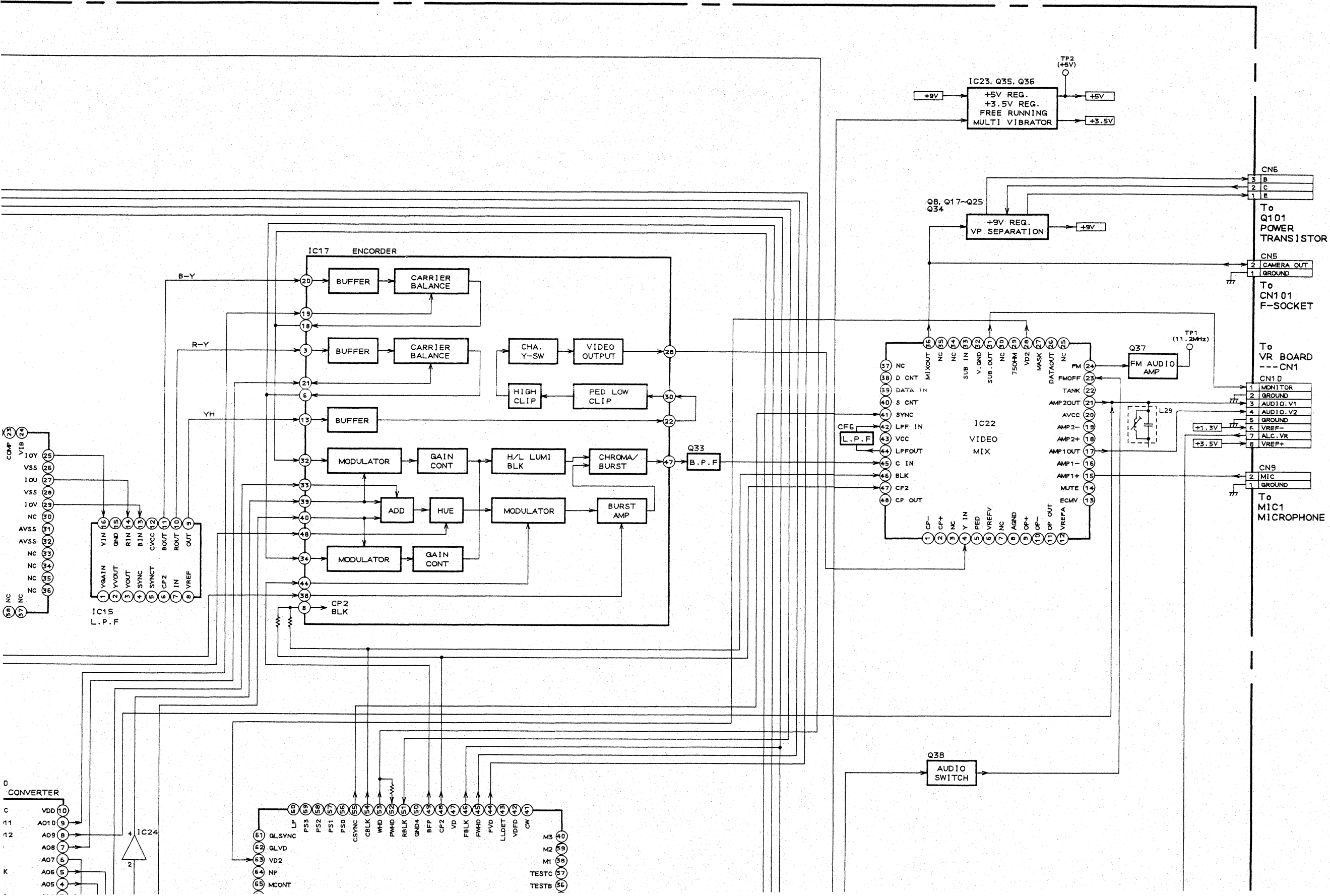


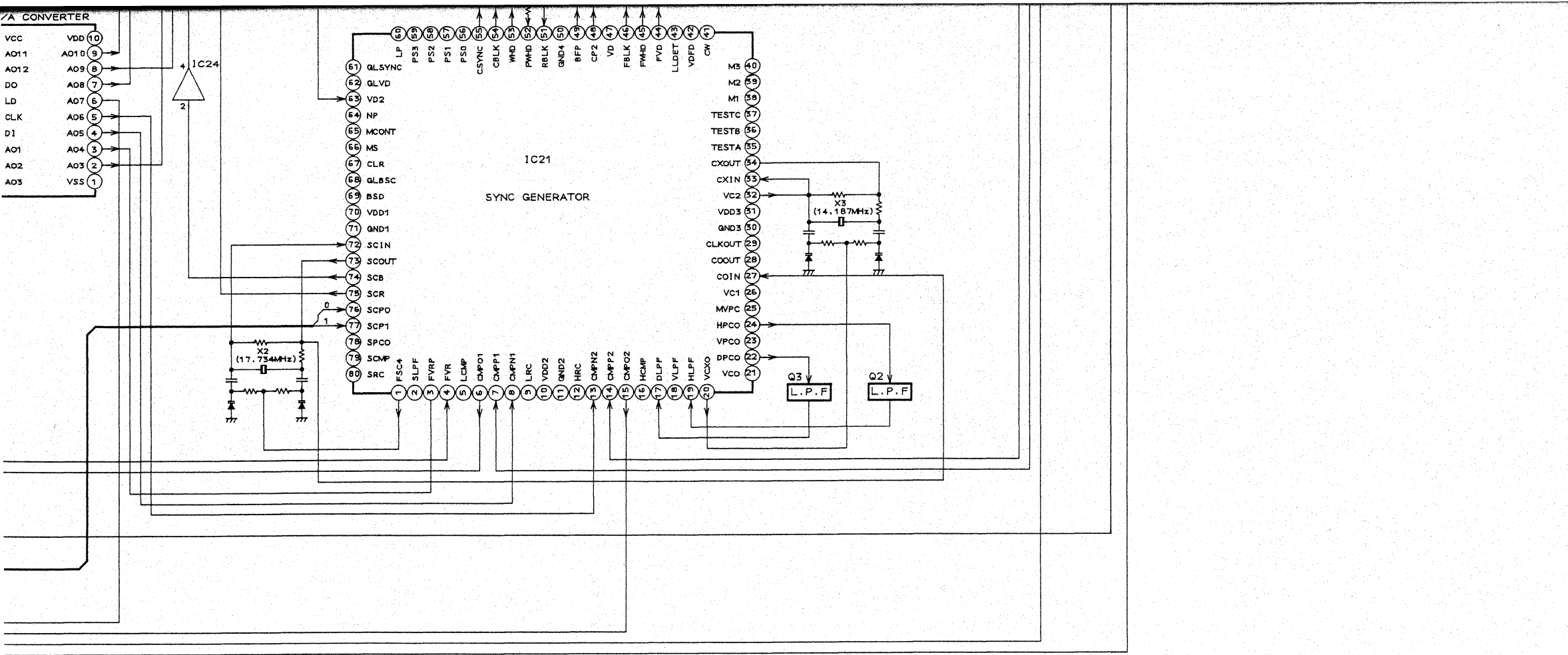


## BLOCK DIAGRAM OF MAIN BOARD

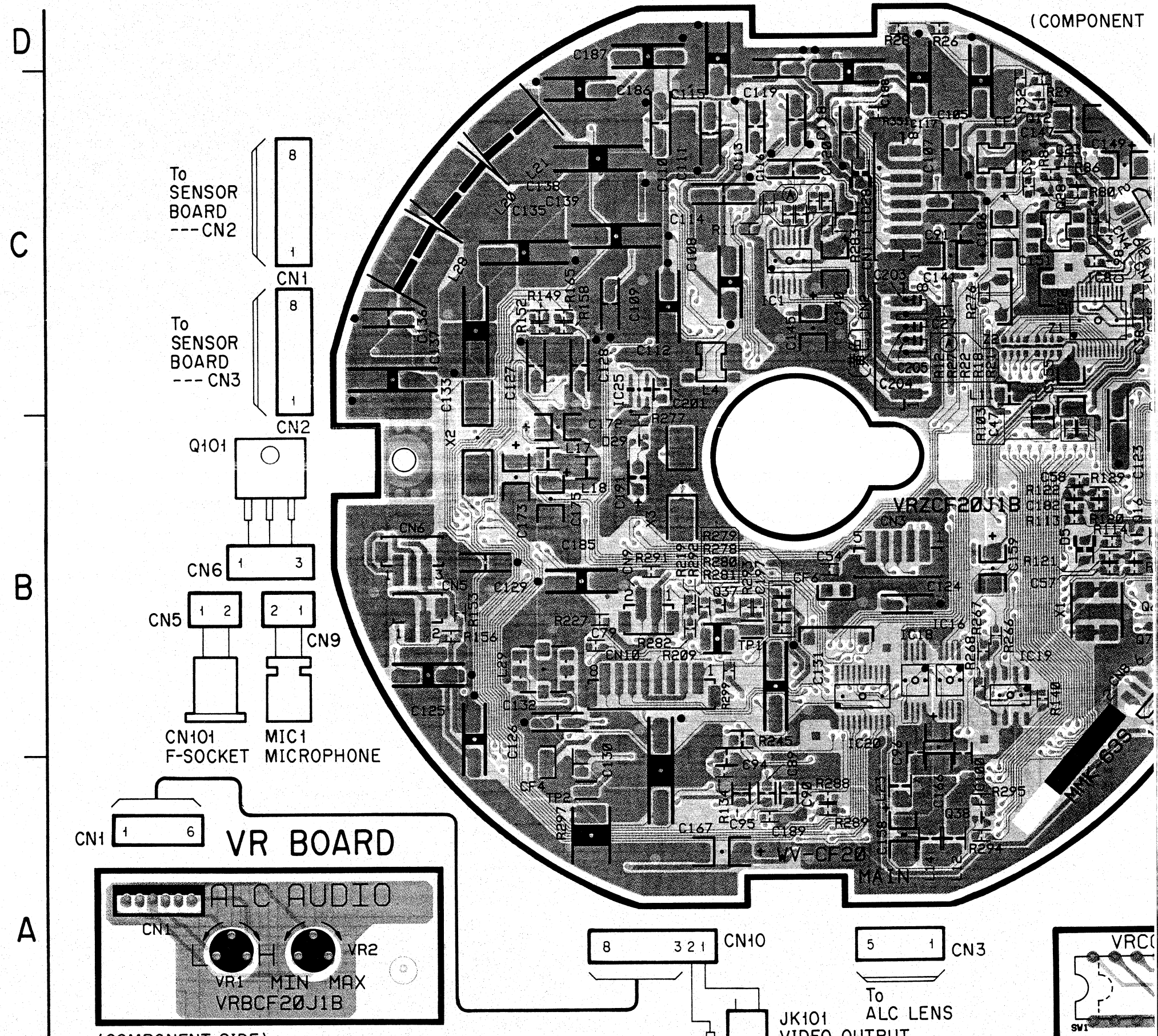








( COMPONENT



A

(COMPONENT SIDE)

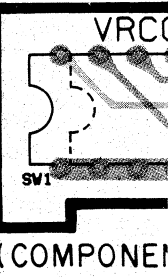
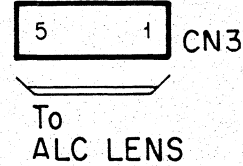
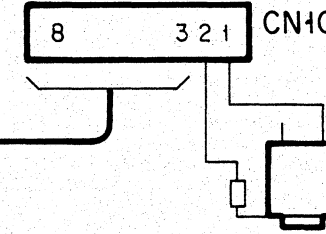
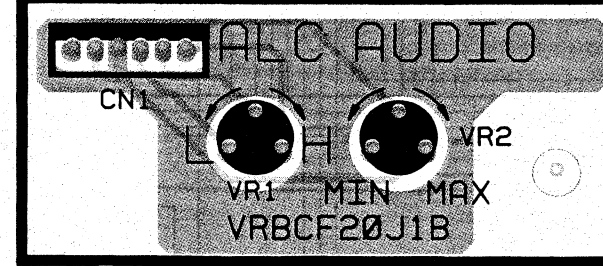
COMPONENT SIDE

PATTERN SIDE

1

2

3



## &lt;Voltages&gt;

## MAIN BOARD

|       | IC1 | IC2 | IC5 | IC8 | IC9 | IC11 | IC12 | IC14 | IC15 | IC16 | IC18 | IC19 | IC20 | IC23 | IC24 | IC25 | IC26 |
|-------|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| Pin 1 | 1.6 | 5.0 | 1.7 | 3.6 | 0   | 2.5  | 0    | 0    | 3.2  | 1.5  | 2.5  | 3.5  | 0    | 0.4  | 0    | 5.0  | 0.2  |
| 2     | 2.7 | 2.7 | 1.7 | 0   | 3.5 | 2.5  | 3.6  | 0    | 4.9  | 1.5  | 2.5  | 3.5  | 1.0  | 1.1  | 2.5  | 2.6  | 1.8  |
| 3     | 2.0 | 2.7 | 1.6 | 1.8 | 3.5 | 2.5  | 3.6  | 0    | 2.2  | 1.5  | 2.5  | 3.5  | 2.5  | 0.5  | 0    | 0    | 0    |
| 4     | 2.2 | 5.0 | 0.2 | 1.6 |     | 0    |      | 0    | 0.3  | 0    | 0    | 3.5  | 1.8  | 0.5  | 2.4  | 0    | 1.8  |
| 5     | 2.7 | 0.9 | 0.2 | 1.9 |     | 2.5  |      | 2.5  | 3.9  | 1.8  | 2.1  | 3.5  | 1.7  | 0.5  | 5.0  | 5.0  | 3.6  |
| 6     | 1.2 | 0.8 | 0.1 | 1.3 |     | 2.5  |      | 2.5  | 0.3  | 1.8  | 2.2  | 0.4  | 2.0  | 1.1  |      |      |      |
| 7     | 0   | 0   | 0   | 2.0 |     | 2.0  |      | 2.5  | 0.7  | 1.8  | 2.2  | 0    | 1.9  | 0    |      |      |      |
| 8     | 3.7 | 1.8 | 0.6 | 1.3 |     | 5.0  |      | 5.0  | 3.9  | 5.0  | 5.0  | 0    | 0    | 4.2  |      |      |      |
| 9     | 0.8 |     | 0.8 | 1.8 |     |      |      |      | 2.8  |      |      |      | 1.8  | 9.0  |      |      |      |
| 10    | 3.7 |     | 0.8 | 0.4 |     |      |      |      | 3.1  |      |      |      | 5.0  | 6.8  |      |      |      |
| 11    | 0.9 |     | 0.8 | 5.0 |     |      |      |      | 3.1  |      |      |      | 5.0  | 0    |      |      |      |
| 12    | 0   |     | 1.2 | 1.8 |     |      |      |      | 4.9  |      |      |      | 0    | 0.9  |      |      |      |
| 13    | 5.0 |     | 1.2 | 5.0 |     |      |      |      | 3.1  |      |      |      | 0    | 0.5  |      |      |      |
| 14    | 5.0 |     | 3.5 | 5.0 |     |      |      |      | 3.1  |      |      |      | 2.5  | 0.5  |      |      |      |
| 15    |     |     |     | 5.0 |     |      |      |      | 0    |      |      |      | 0    | 0.5  |      |      |      |
| 16    |     |     |     | 5.0 |     |      |      |      | 2.8  |      |      |      | 0    | 2.5  |      |      |      |
| 17    |     |     |     | 3.4 |     |      |      |      |      |      |      |      | 3.5  |      |      |      |      |
| 18    |     |     |     | 5.0 |     |      |      |      |      |      |      |      | 0    |      |      |      |      |
| 19    |     |     |     | 2.0 |     |      |      |      |      |      |      |      | 1.7  |      |      |      |      |
| 20    |     |     |     | 0   |     |      |      |      |      |      |      |      | 0    |      |      |      |      |
| 21    |     |     |     | 0   |     |      |      |      |      |      |      |      |      |      |      |      |      |
| 22    |     |     |     | 0   |     |      |      |      |      |      |      |      |      |      |      |      |      |
| 23    |     |     |     | 1.4 |     |      |      |      |      |      |      |      |      |      |      |      |      |
| 24    |     |     |     | 0   |     |      |      |      |      |      |      |      |      |      |      |      |      |

|    | G   | D   | S   |
|----|-----|-----|-----|
| Q1 | 0.9 | 5.0 | 1.6 |
| 2  | 2.9 | 5.0 | 3.1 |
| 3  | 2.3 | 5.0 | 2.6 |

## MAIN BOARD

|     | B    | C    | E    |
|-----|------|------|------|
| Q4  | 3.5  | 1.5  | 2.6  |
| 5   | 0    | 1.5  | 2.6  |
| 6   | 3.5  | 1.5  | 2.6  |
| 7   | 0    | 1.5  | 2.3  |
| 8   | 8.4  | 4.2  | 9.1  |
| 9   | 1.8  | 5.0  | 1.1  |
| 10  | 1.7  | 3.0  | 1.1  |
| 11  | 3.0  | 5.0  | 2.4  |
| 12  | 1.7  | 4.1  | 1.0  |
| 13  | 4.1  | 5.0  | 3.4  |
| 14  | 1.5  | 4.6  | 0.9  |
| 15  | 2.5  | 5.0  | 2.0  |
| 16  | 0.7  | 0.1  | 0    |
| 17  | 12.0 | 12.0 | 11.7 |
| 18  | 0.1  | 11.7 | 0    |
| 19  | 12.0 | 12.0 | 11.7 |
| 20  | 11.2 | 12.0 | 10.6 |
| 21  | 0.7  | 0.1  | 0    |
| 22  | 0.3  | 11.2 | 0    |
| 23  | 0    | 9.1  | 0    |
| 24  | 0    | 0.3  | 0    |
| 25  | 6.6  | 8.5  | 6.0  |
| 26  | 1.0  | 0    | 1.5  |
| 27  | 2.0  | 0    | 2.5  |
| 28  | 2.1  | 0    | 2.7  |
| 29  | 2.9  | 3.5  | 3.6  |
| 32  | 0.5  | 0    | 1.1  |
| 33  | 1.8  | 0    | 2.4  |
| 34  | 11.2 | 10.6 | 11.2 |
| 35  | 8.4  | 5.5  | 9.0  |
| 36  | 8.6  | 3.8  | 9.0  |
| 37  | 1.5  | 4.2  | 0.9  |
| 38  | 0    | 1.5  | 0    |
| 101 | 10.5 | 12.0 | 9.8  |

|       | IC4  | IC6 | IC10 | IC17 | IC22 |
|-------|------|-----|------|------|------|
| Pin 1 | -9.8 | 1.9 | 1.3  | 0    | 2.0  |
| 2     | 9.4  | 2.0 | 1.6  | 4.9  | 2.0  |
| 3     | 0    | 1.9 | 1.6  | 2.6  | 0    |
| 4     | 0    | 1.9 | 1.6  | 1.8  | 2.9  |
| 5     | 3.3  | 2.2 | 1.7  | 4.9  | 0    |
| 6     | 6.5  | 0   | 0    | 3.2  | 2.0  |
| 7     | 5.4  | 0.1 | 0    | 4.9  | 0    |
| 8     | 2.2  | 0.1 | 3.6  | 0.8  | 0    |
| 9     | 4.4  | 0.1 | 1.5  | 0    | 1.6  |
| 10    | 9.2  | 0   | 1.5  | 1.8  | 1.6  |
| 11    | 14.0 | 3.3 | 1.4  | 1.9  | 0    |
| 12    | 0.7  | 5.0 | 1.4  | 0    | 1.6  |
| 13    | 4.6  | 1.5 | 1.4  | 1.8  | 0    |
| 14    | 9.2  | 0.8 | 1.0  | 0    | 1.6  |
| 15    | 5.0  | 1.8 | 1.4  | 1.8  | 1.6  |
| 16    | -4.6 | 2.4 | 0    | 1.8  | 1.6  |
| 17    | 14.8 | 2.0 | 0    | 4.9  | 2.0  |
| 18    | 0    | 1.9 | 1.8  | 3.2  | 1.6  |
| 19    | 13.9 | 1.7 | 3.6  | 1.8  | 1.6  |
| 20    | 9.4  | 1.9 | 3.6  | 2.6  | 4.6  |
| 21    | 0.2  | 1.9 | 1.9  | 1.8  | 1.6  |
| 22    | 0.1  | 2.2 | 1.9  | 2.4  | 1.6  |
| 23    | 4.6  | 1.9 | 1.6  | 0    | 1.5  |
| 24    | 14.8 | 3.4 | 1.5  | 0    | 1.6  |
| 25    | 14.7 | 1.9 | 2.8  | 0    | 1.6  |
| 26    | 0.5  | 1.9 | 0    | 0    | 0    |
| 27    | 0.9  | 5.0 | 3.1  | 1.8  | 0    |
| 28    | 0.6  | 1.4 | 0    | 2.1  | 5.0  |
| 29    | -8.0 | 0   | 3.1  | 1.3  | 2.0  |
| 30    | 0    | 2.0 | 0    | 1.9  | 2.0  |
| 31    | -7.7 | 0   | 0    | 1.8  | 2.6  |
| 32    | -8.4 | 1.9 | 0    | 1.8  | 0    |
| 33    | -9.8 | 0   | 1.0  | 2.5  |      |
| 34    | -9.8 | 0   | 1.8  | 1.8  |      |
| 35    | 14.7 | 0   | 3.0  | 2.0  |      |
| 36    | -9.8 | 0   | 4.9  | 2.5  |      |
| 37    | 3.6  | 0   | 3.0  | 0    |      |
| 38    | 3.5  | 0   | 2.1  | 2.0  |      |
| 39    | 3.3  | 0   | 1.8  | 2.0  |      |
| 40    | 3.4  | 0   | 1.8  | 1.5  |      |
| 41    | 3.5  | 1.7 | 3.0  | 4.6  |      |
| 42    | -6.4 | 0   | 4.9  | 2.2  |      |
| 43    | -8.9 | 0   | 0    | 5.0  |      |
| 44    | -9.8 | 3.6 | 0.4  | 2.3  |      |
| 45    | 0    | 1.5 | 2.5  | 2.0  |      |
| 46    | 0    | 1.5 | 0    | 1.2  |      |
| 47    | 0    | 1.4 | 2.6  | 0.2  |      |
| 48    | -4.9 | 1.4 | 1.4  | 0.1  |      |

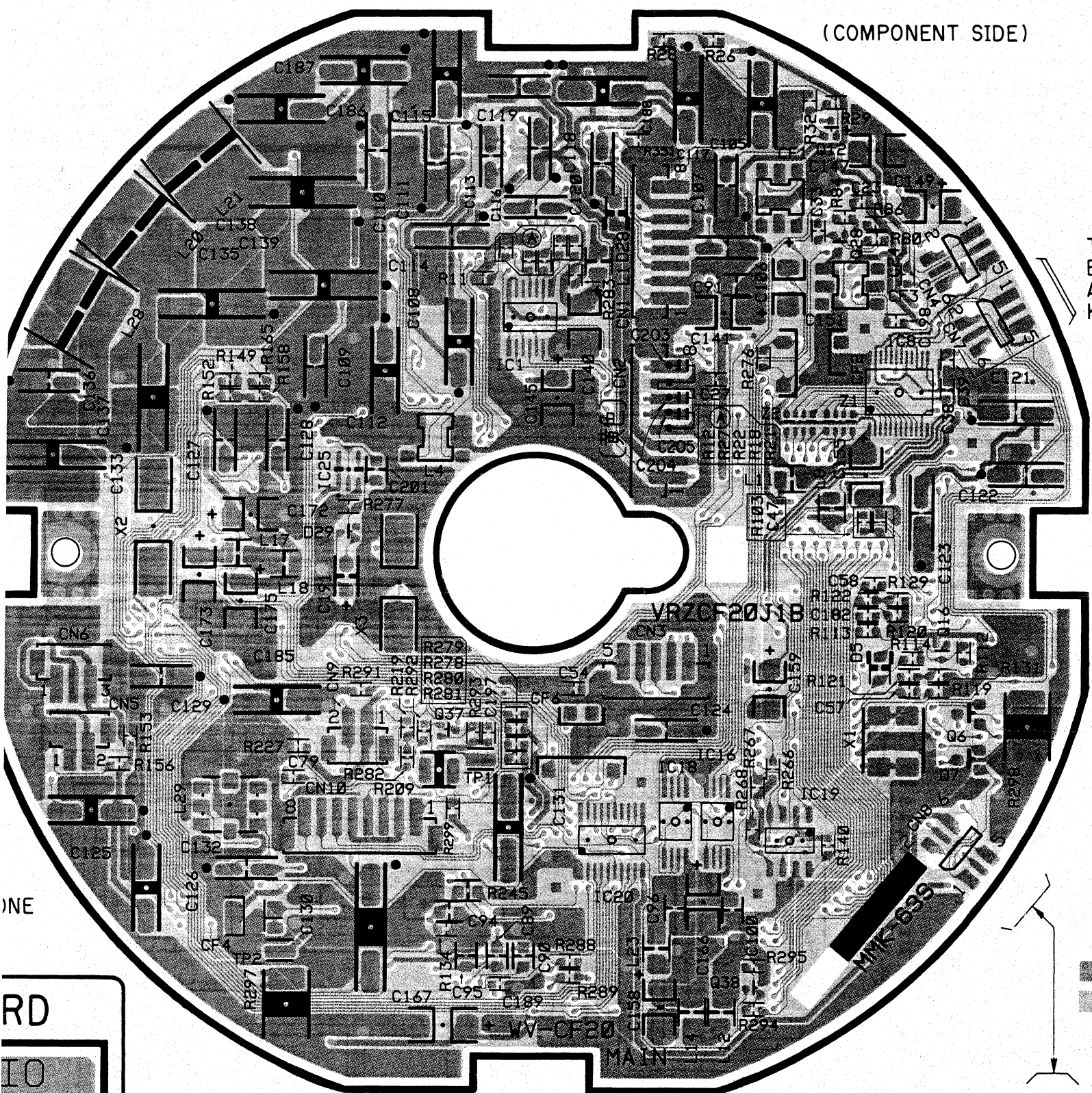
|       | IC3 | IC7 | IC13 | IC21 |
|-------|-----|-----|------|------|
| Pin 1 | 1.8 | 1.8 | 2.3  | 3.1  |
| 2     | 1.7 | 0   | 2.3  | 0.6  |
| 3     | 0   | 0   | 2.3  | 2.6  |
| 4     | 3.5 | 0.8 | 2.3  | 3.0  |
| 5     | 0   | 0.9 | 2.3  | 0    |
| 6     | 0   | 0   | 2.7  | 1.4  |
| 7     | 0   | 0   | 2.7  | 1.8  |
| 8     | 0   | 0   | 3.2  | 1.8  |
| 9     | 0.8 | 0   | 2.4  | 0    |
| 10    | 0.6 | 3.5 | 3.0  | 5.0  |
| 11    | 0.1 | 0   | 2.7  | 0    |
| 12    | 0.9 | 1.9 | 2.6  | 0    |
| 13    | 0   | 1.9 | 2.3  | 1.8  |
| 14    | 0.4 | 2.0 | 2.3  | 1.8  |
| 15    | 0.1 | 1.3 | 0    | 3.2  |
| 16    | 0.1 | 2.4 | 3.5  | 0    |
| 17    | 0.6 | 1.2 | 3.3  | 2.5  |
| 18    | 0.1 | 0.5 | 3.4  | 0.1  |
| 19    | 1.8 | 0.7 | 2.9  | 0    |
| 20    | 1.8 | 0   | 0.9  | 2.5  |
| 21    | 0   | 0.6 | 2.7  | 0.3  |
| 22    | 3.5 | 0.4 | 2.7  | 2.3  |
| 23    | 3.3 | 1.1 | 3.6  | 0.1  |
| 24    | 0   | 2.4 | 0    | 2.9  |
| 25    | 3.5 | 1.2 | 0.1  | 0    |
| 26    | 0.9 | 1.9 | 0.2  | 0    |
| 27    | 0.9 | 1.8 | 0.2  | 2.7  |
| 28    | 0.1 | 1.8 | 1.6  | 2.4  |
| 29    | 3.4 | 2.5 | 1.7  | 2.4  |
| 30    | 0.2 | 0   | 1.7  | 0    |
| 31    | 3.5 | 3.3 | 0    | 5.0  |
| 32    | 3.5 | 1.7 | 0    | 0    |
| 33    | 3.5 | 0   | 0    | 0    |
| 34    | 3.5 | 0.6 | 3.5  | 5.0  |
| 35    | 2.0 | 0.5 | 0    | 0    |
| 36    | 1.6 | 0.6 | 0    | 0    |
| 37    | 0   | 0.4 | 0    | 0    |
| 38    | 3.5 | 0.6 | 0    | 5.0  |
| 39    | 2.7 | 0.1 | 0    | 5.0  |
| 40    | 0   | 3.5 | 0    | 0    |

|        | IC3 | IC7 | IC13 | IC21 |
|--------|-----|-----|------|------|
| Pin 41 | 0.9 | 3.4 | 3.5  | 0    |
| 42     | 1.7 | 3.3 | 0    | 5.0  |
| 43     | 0.9 | 2.3 | 3.5  | 0    |
| 44     | 0.8 | 2.3 | 3.5  | 0.2  |
| 45     | 0.9 | 2.6 | 0.4  | 0.8  |
| 46     | 0.9 | 2.7 | 3.5  | 1.2  |
| 47     | 0   | 2.3 | 0    | 0.2  |
| 48     | 0   | 2.3 | 0    | 0.2  |
| 49     | 1.8 | 2.3 | 0.2  | 0.2  |
| 50     | 0   | 3.5 | 1.5  | 0    |
| 51     | 0   | 0   | 0    | 1.5  |
| 52     | 0   | 1.0 | 3.5  | 0.8  |
| 53     | 0   | 0.8 | 3.5  | 0.8  |
| 54     | 1.7 | 1.0 | 0    | 1.2  |
| 55     | 0   | 0.7 | 0.7  | 4.6  |
| 56     | 3.5 | 0.9 | 0    | 5.0  |
| 57     | 0   | 0.7 | 2.2  | 5.0  |
| 58     | 3.5 | 0.7 | 1.4  | 5.0  |
| 59     | 3.5 | 0.6 | 2.1  | 5.0  |
| 60     | 3.5 | 1.8 | 2.5  | 0    |
| 61     | 0   | 0.1 | 1.8  | 0    |
| 62     | 0   | 1.5 | 2.3  | 5.0  |
| 63     | 0   | 1.5 | 0.1  | 5.0  |
| 64     | 1.7 | 1.5 | 0.1  | 5.0  |
| 65     | 1.5 | 0.1 | 0    |      |
| 66     | 1.5 | 2.3 | 5.0  |      |
| 67     | 1.5 | 3.4 | 5.0  |      |
| 68     | 1.5 | 3.5 | 0    |      |
| 69     | 1.5 | 3.5 | 0    |      |
| 70     | 3.5 | 0.6 | 5.0  |      |
| 71     | 0   | 0.6 | 0    |      |
| 72     | 0.5 | 0.7 | 2.6  |      |
| 73     | 0.3 | 0.8 | 2.7  |      |
| 74     | 1.0 | 0.6 | 2.5  |      |
| 75     | 0.8 | 1.0 | 2.5  |      |
| 76     | 1.0 | 0.7 | 0    |      |
| 77     | 1.8 | 1.0 | 0    |      |
| 78     | 1.7 | 0   | 0.1  |      |
| 79     | 1.5 | 2.3 | 0    |      |
| 80     | 0   | 2.3 | 0    |      |

CONDUCTOR VIEW OF MAIN BOARD, SWITCH BOARD, VR BOARD

MAIN BOARD

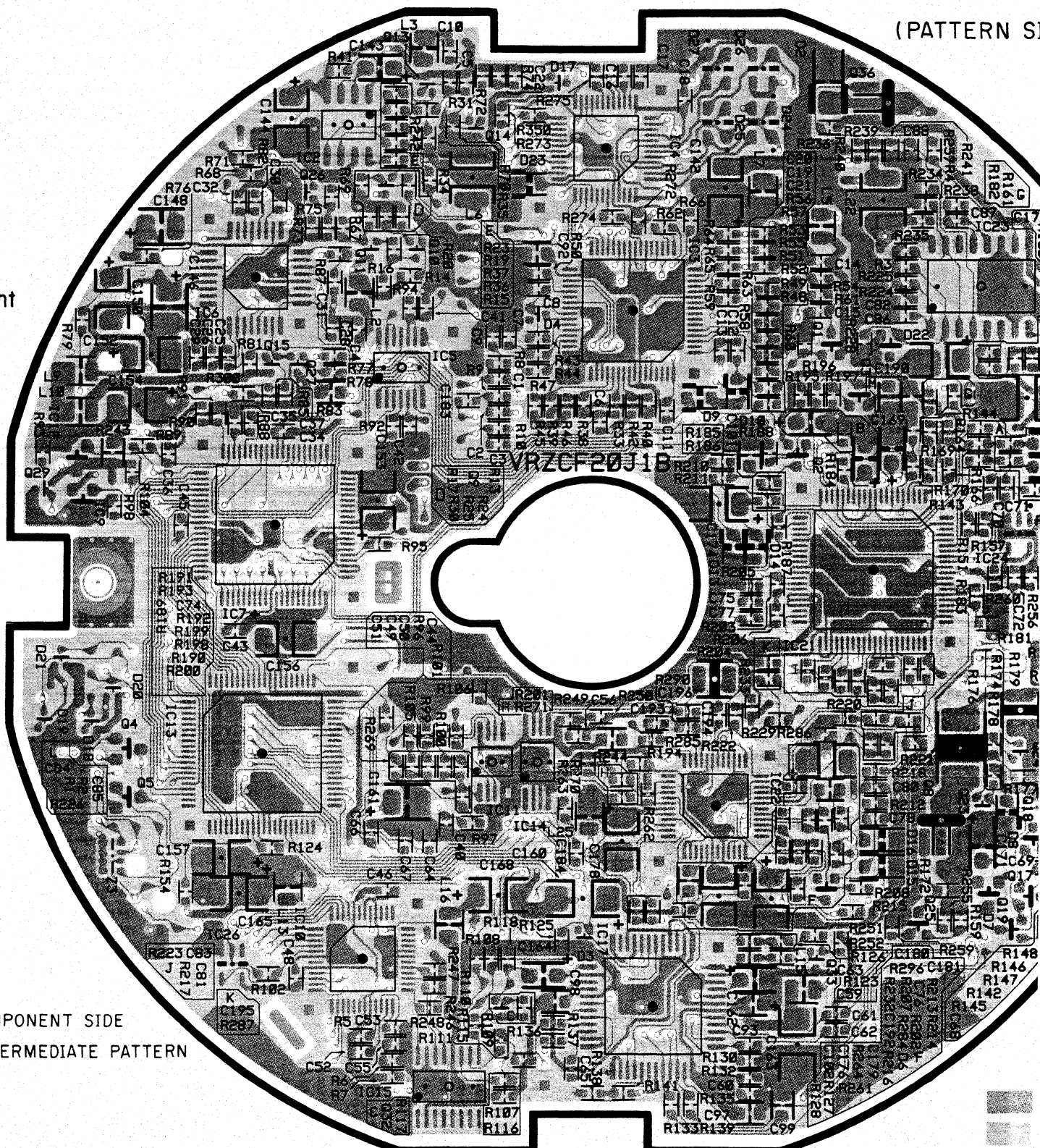
(COMPONENT SIDE)



To EVR Adjustment Kit

MAIN BOARD

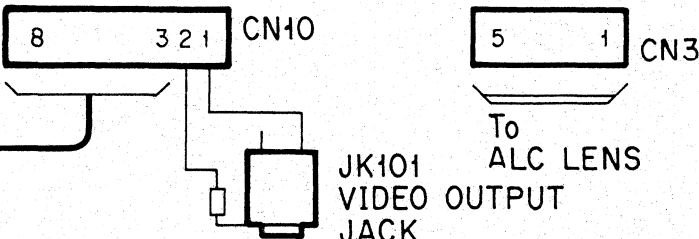
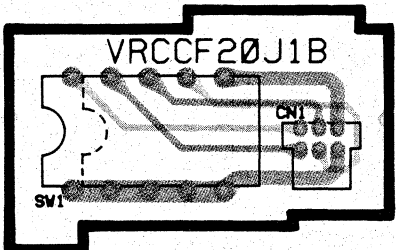
(PATTERN SIDE)

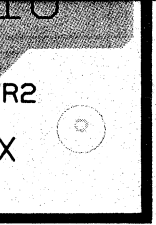


COMPONENT SIDE  
INTERMEDIATE PATTERN

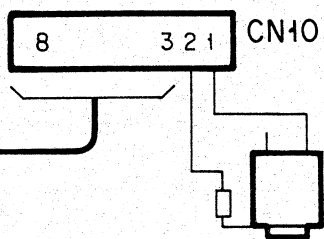
SWITCH BOARD

COMPONENT SIDE  
PATTERN SIDE

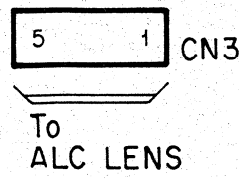




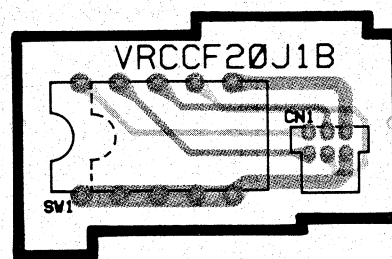
COMPONENT SIDE  
PATTERN SIDE



JK101  
VIDEO OUTPUT  
JACK



To  
ALC LENS



(COMPONENT SIDE)

## SWITCH BOARD

COMPONENT SIDE  
PATTERN SIDE

2

3

4

5

6

### MAIN BOARD

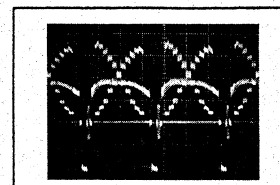
| E     | IC4  | IC6  | IC10 | IC17 | IC22 |
|-------|------|------|------|------|------|
| Pin 1 | -9.8 | 1.9  | 1.3  | 0    | 2.0  |
| 2.6   | 2    | 9.4  | 2.0  | 1.6  | 4.9  |
| 2.6   | 3    | 0    | 1.9  | 1.6  | 2.6  |
| 2.6   | 4    | 0    | 1.9  | 1.6  | 1.8  |
| 2.3   | 5    | 3.3  | 2.2  | 1.7  | 4.9  |
| 9.1   | 6    | 6.5  | 0    | 0    | 3.2  |
| 1.1   | 7    | 5.4  | 0.1  | 0    | 4.9  |
| 1.1   | 8    | 2.2  | 0.1  | 3.6  | 0.8  |
| 2.4   | 9    | 4.4  | 0.1  | 1.5  | 0    |
| 1.0   | 10   | 9.2  | 0    | 1.5  | 1.8  |
| 3.4   | 11   | 14.0 | 3.3  | 1.4  | 1.9  |
| 0.9   | 12   | 0.7  | 5.0  | 1.4  | 0    |
| 2.0   | 13   | 4.6  | 1.5  | 1.4  | 1.8  |
| 0     | 14   | 9.2  | 0.8  | 1.0  | 0    |
| 11.7  | 15   | 5.0  | 1.8  | 1.4  | 1.8  |
| 0     | 16   | -4.6 | 2.4  | 0    | 1.8  |
| 11.7  | 17   | 14.8 | 2.0  | 0    | 4.9  |
| 10.6  | 18   | 0    | 1.9  | 1.8  | 3.2  |
| 0     | 19   | 13.9 | 1.7  | 3.6  | 1.8  |
| 0     | 20   | 9.4  | 1.9  | 3.6  | 2.6  |
| 0     | 21   | 0.2  | 1.9  | 1.9  | 1.8  |
| 6.0   | 22   | 0.1  | 2.2  | 1.9  | 2.4  |
| 1.5   | 23   | 4.6  | 1.9  | 1.6  | 0    |
| 2.5   | 24   | 14.8 | 3.4  | 1.5  | 0    |
| 2.7   | 25   | 14.7 | 1.9  | 2.8  | 0    |
| 3.6   | 26   | 0.5  | 1.9  | 0    | 0    |
| 1.1   | 27   | 0.9  | 5.0  | 3.1  | 1.8  |
| 2.4   | 28   | 0.6  | 1.4  | 0    | 2.1  |
| 11.2  | 29   | -8.0 | 0    | 3.1  | 1.3  |
| 9.0   | 30   | 0    | 2.0  | 0    | 1.9  |
| 9.0   | 31   | -7.7 | 0    | 0    | 1.8  |
| 0.9   | 32   | -8.4 | 1.9  | 0    | 1.8  |
| 0     | 33   | -9.8 | 0    | 1.0  | 2.5  |
| 9.8   | 34   | -9.8 | 0    | 1.8  | 1.8  |
|       | 35   | 14.7 | 0    | 3.0  | 2.0  |
|       | 36   | -9.8 | 0    | 4.9  | 2.5  |
|       | 37   | 3.6  | 0    | 3.0  | 0    |
|       | 38   | 3.5  | 0    | 2.1  | 2.0  |
|       | 39   | 3.3  | 0    | 1.8  | 2.0  |
|       | 40   | 3.4  | 0    | 1.8  | 1.5  |
|       | 41   | 3.5  | 1.7  | 3.0  | 4.6  |
|       | 42   | -6.4 | 0    | 4.9  | 2.2  |
|       | 43   | -8.9 | 0    | 0    | 5.0  |
|       | 44   | -9.8 | 3.6  | 0.4  | 2.3  |
|       | 45   | 0    | 1.5  | 2.5  | 2.0  |
|       | 46   | 0    | 1.5  | 0    | 1.2  |
|       | 47   | 0    | 1.4  | 2.6  | 0.2  |
|       | 48   | -4.9 | 1.4  | 1.4  | 0.1  |

| IC3   | IC7 | IC13 | IC21 |
|-------|-----|------|------|
| Pin 1 | 1.8 | 1.8  | 2.3  |
| 2     | 1.7 | 0    | 2.3  |
| 3     | 0   | 0    | 2.3  |
| 4     | 3.5 | 0.8  | 2.3  |
| 5     | 0   | 0.9  | 2.3  |
| 6     | 0   | 0    | 2.7  |
| 7     | 0   | 0    | 2.7  |
| 8     | 0   | 0    | 3.2  |
| 9     | 0.8 | 0    | 2.4  |
| 10    | 0.6 | 3.5  | 3.0  |
| 11    | 0.1 | 0    | 2.7  |
| 12    | 0.9 | 1.9  | 2.6  |
| 13    | 0   | 1.9  | 2.3  |
| 14    | 0.4 | 2.0  | 2.3  |
| 15    | 0.1 | 1.3  | 0    |
| 16    | 0.1 | 2.4  | 3.5  |
| 17    | 0.6 | 1.2  | 3.3  |
| 18    | 0.1 | 0.5  | 3.4  |
| 19    | 1.8 | 0.7  | 2.9  |
| 20    | 1.8 | 0    | 0.9  |
| 21    | 0   | 0.6  | 2.7  |
| 22    | 3.5 | 0.4  | 2.7  |
| 23    | 3.3 | 1.1  | 3.6  |
| 24    | 0   | 2.4  | 0    |
| 25    | 3.5 | 1.2  | 0.1  |
| 26    | 0.9 | 1.9  | 0.2  |
| 27    | 0.9 | 1.8  | 0.2  |
| 28    | 0.1 | 1.8  | 1.6  |
| 29    | 3.4 | 2.5  | 1.7  |
| 30    | 0.2 | 0    | 1.7  |
| 31    | 3.5 | 3.3  | 0    |
| 32    | 3.5 | 1.7  | 0    |
| 33    | 3.5 | 0    | 0    |
| 34    | 3.5 | 0.6  | 3.5  |
| 35    | 2.0 | 0.5  | 0    |
| 36    | 1.6 | 0.6  | 0    |
| 37    | 0   | 0.4  | 0    |
| 38    | 3.5 | 0.6  | 0    |
| 39    | 2.7 | 0.1  | 0    |
| 40    | 0   | 3.5  | 0    |

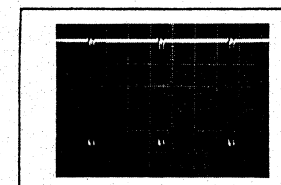
| IC3    | IC7 | IC13 | IC21 |
|--------|-----|------|------|
| Pin 41 | 0.9 | 3.4  | 3.5  |
| 42     | 1.7 | 3.3  | 0    |
| 43     | 0.9 | 2.3  | 3.5  |
| 44     | 0.8 | 2.3  | 3.5  |
| 45     | 0.9 | 2.6  | 0.4  |
| 46     | 0.9 | 2.7  | 3.5  |
| 47     | 0   | 2.3  | 0    |
| 48     | 0   | 2.3  | 0    |
| 49     | 1.8 | 2.3  | 0.2  |
| 50     | 0   | 3.5  | 1.5  |
| 51     | 0   | 0    | 1.5  |
| 52     | 0   | 1.0  | 3.5  |
| 53     | 0   | 0.8  | 3.5  |
| 54     | 1.7 | 1.0  | 0    |
| 55     | 0   | 0.7  | 0.7  |
| 56     | 3.5 | 0.9  | 0    |
| 57     | 0   | 0.7  | 2.2  |
| 58     | 3.5 | 0.7  | 1.4  |
| 59     | 3.5 | 0.6  | 2.1  |
| 60     | 3.5 | 1.8  | 2.5  |
| 61     | 0   | 0.1  | 1.8  |
| 62     | 0   | 1.5  | 2.3  |
| 63     | 0   | 1.5  | 0.1  |
| 64     | 1.7 | 1.5  | 0.1  |
| 65     | 1.5 | 0.1  | 0    |
| 66     | 1.5 | 2.3  | 5.0  |
| 67     | 1.5 | 3.4  | 5.0  |
| 68     | 1.5 | 3.5  | 0    |
| 69     | 1.5 | 3.5  | 0    |
| 70     | 3.5 | 0.6  | 5.0  |
| 71     | 0   | 0.6  | 0    |
| 72     | 0.5 | 0.7  | 2.6  |
| 73     | 0.3 | 0.8  | 2.7  |
| 74     | 1.0 | 0.6  | 2.5  |
| 75     | 0.8 | 1.0  | 2.5  |
| 76     | 1.0 | 0.7  | 0    |
| 77     | 1.8 | 1.0  | 0    |
| 78     | 1.7 | 0    | 0.1  |
| 79     | 1.5 | 2.3  | 0    |
| 80     | 0   | 2.3  | 0    |

### <Wave Form>

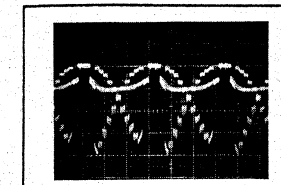
1. 20  $\mu$ sec/DIV 0.2V/DIV



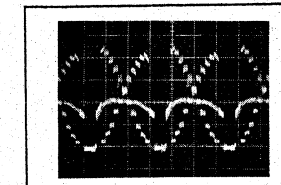
6. 20  $\mu$ sec/DIV 2V/DIV



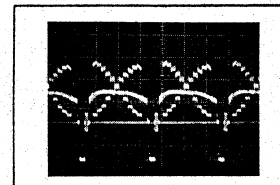
11. 20  $\mu$ sec/DIV 0.1V/DIV



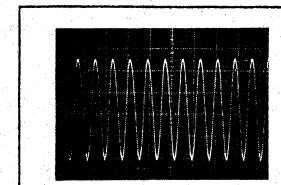
16. 20  $\mu$ sec/DIV 0.1V/DIV



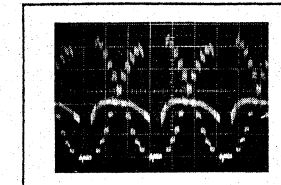
2. 20  $\mu$ sec/DIV 0.5V/DIV



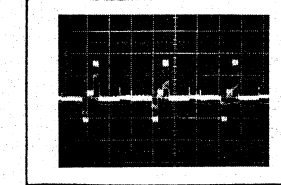
7. 0.1  $\mu$ sec/DIV 1V/DIV



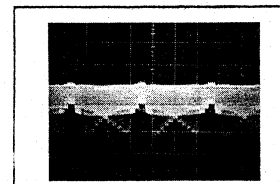
12. 20  $\mu$ sec/DIV 0.2V/DIV



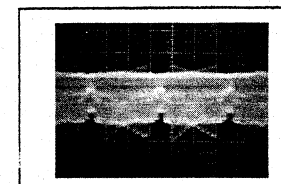
17. 20  $\mu$ sec/DIV 0.2V/DIV



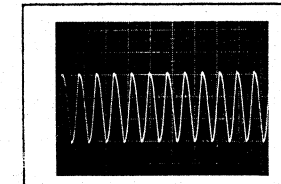
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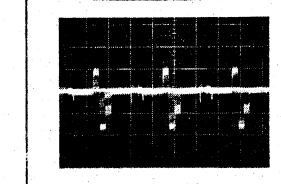
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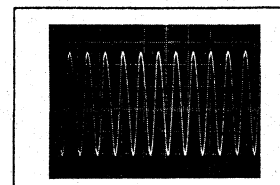
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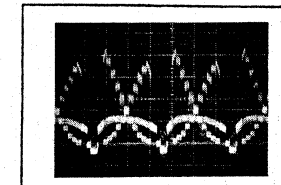
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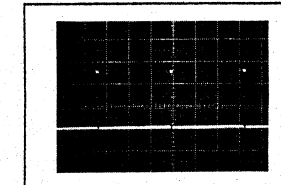
4. 0.1  $\mu$ sec/DIV 1V/DIV



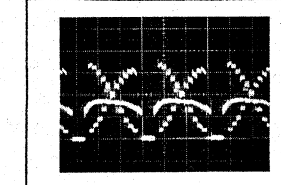
9. 20  $\mu$ sec/DIV 0.2V/DIV



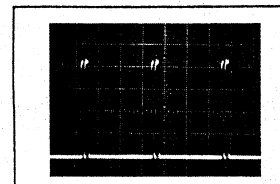
14. 5msec/DIV 2V/DIV



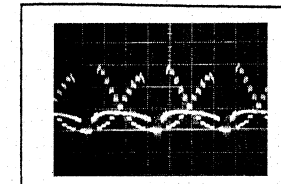
19. 20  $\mu$ sec/DIV 0.2V/DIV



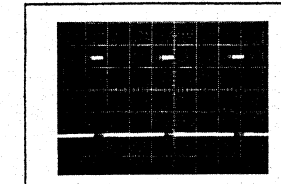
5. 20  $\mu$ sec/DIV 2V/DIV



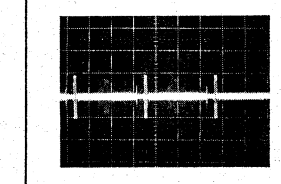
10. 20  $\mu$ sec/DIV 0.1V/DIV



15. 20  $\mu$ sec/DIV 1V/DIV



20. 20  $\mu$ sec/DIV 0.2V/DIV

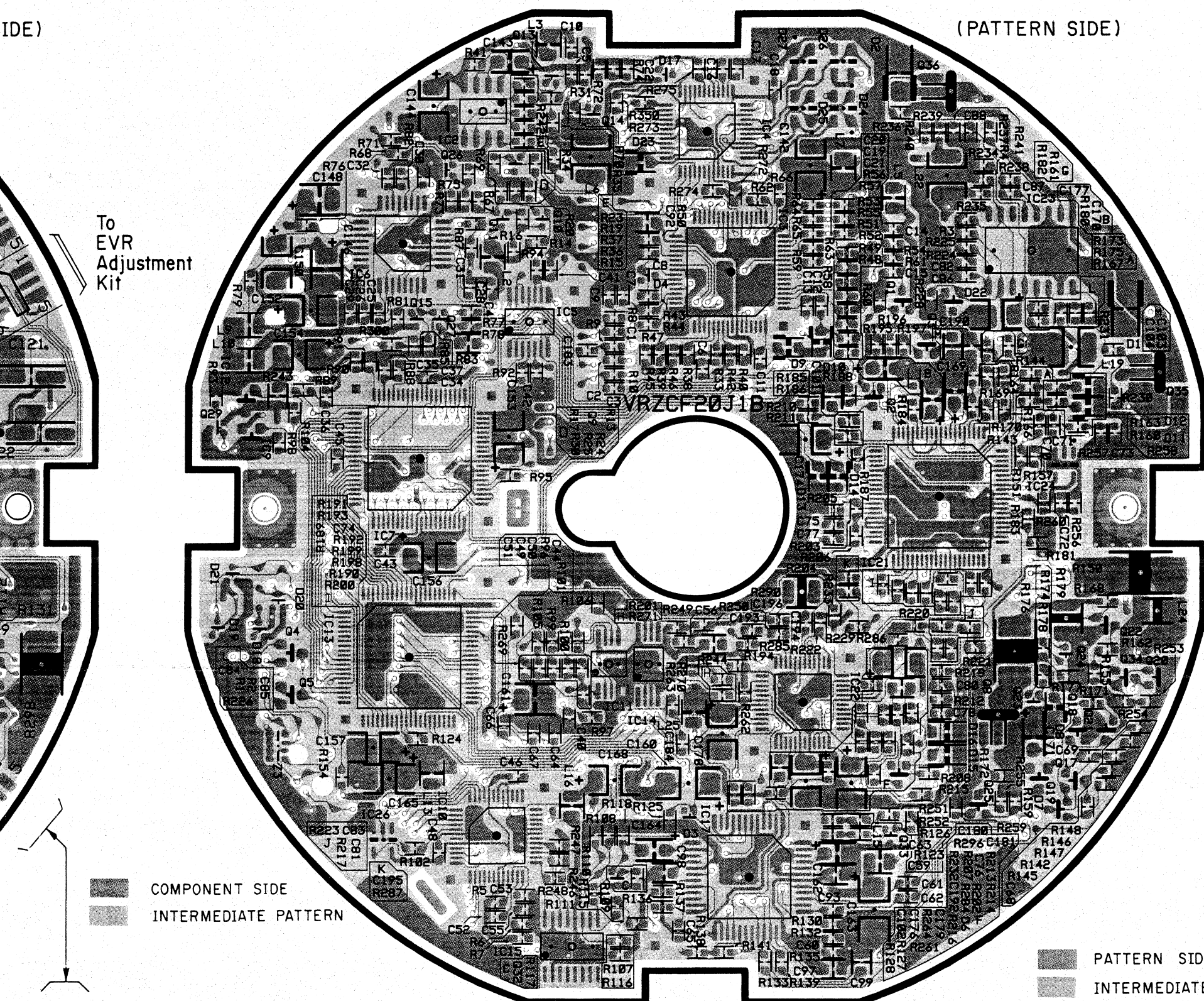


RD, SWITCH BOARD, VR BOARD

## MAIN BOARD

(PATTERN SIDE)

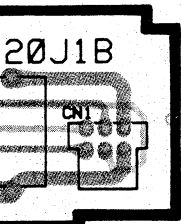
IDE)



<Index>

### MAIN BOARD

|      |    |
|------|----|
| IC1  | C3 |
| IC2  | C5 |
| IC3  | C6 |
| IC4  | C6 |
| IC5  | C5 |
| IC6  | C5 |
| IC7  | B5 |
| IC8  | C4 |
| IC9  | C4 |
| IC10 | B5 |
| IC11 | B5 |
| IC12 | C4 |
| IC13 | B5 |
| IC14 | B5 |
| IC15 | A5 |
| IC16 | B3 |
| IC17 | A6 |
| IC18 | B3 |
| IC19 | B3 |
| IC20 | B3 |
| IC21 | B6 |
| IC22 | B6 |
| IC23 | C6 |
| IC24 | B7 |
| IC25 | C2 |
| IC26 | B5 |
| Q1   | C6 |
| Q2   | C6 |
| Q3   | C6 |
| Q4   | B5 |
| Q5   | B5 |
| Q6   | B4 |
| Q7   | B4 |
| Q8   | B6 |
| Q9   | C5 |
| Q10  | C5 |
| Q11  | C5 |
| Q12  | C3 |
| Q13  | D5 |
| Q14  | C5 |
| Q15  | C5 |
| Q16  | B4 |
| Q17  | B7 |
| Q18  | B7 |
| Q19  | B7 |
| Q20  | B7 |
| Q21  | B7 |
| Q22  | B7 |
| Q23  | B6 |
| Q24  | B7 |
| Q25  | B6 |
| Q26  | C5 |
| Q27  | C5 |
| Q28  | C3 |
| Q29  | C4 |
| Q32  | A5 |
| Q33  | A6 |
| Q34  | B7 |
| Q35  | C7 |
| Q36  | D6 |



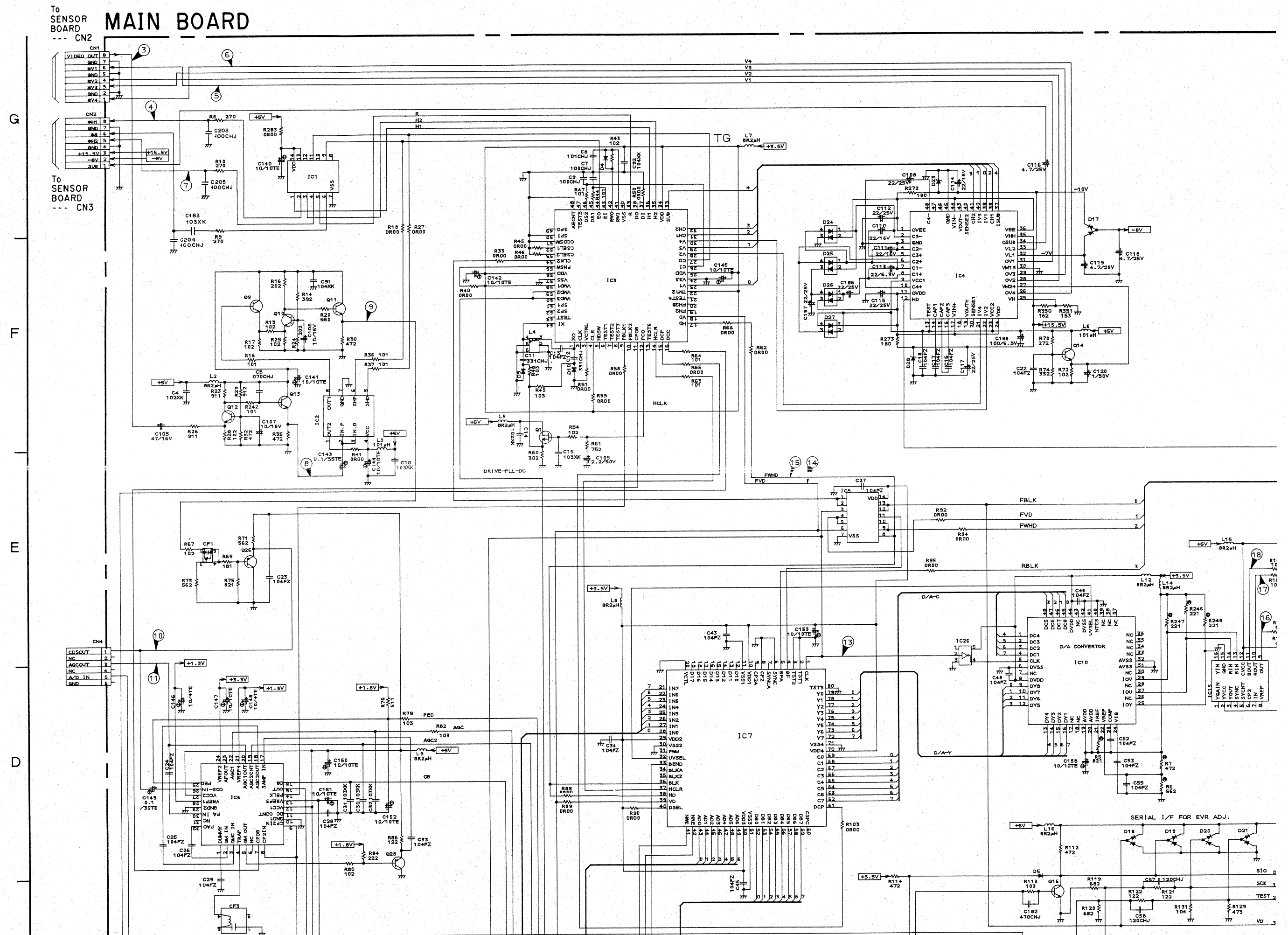
## SWITCH BOARD

COMPONENT SIDE  
PATTERN SIDE

SIDE)

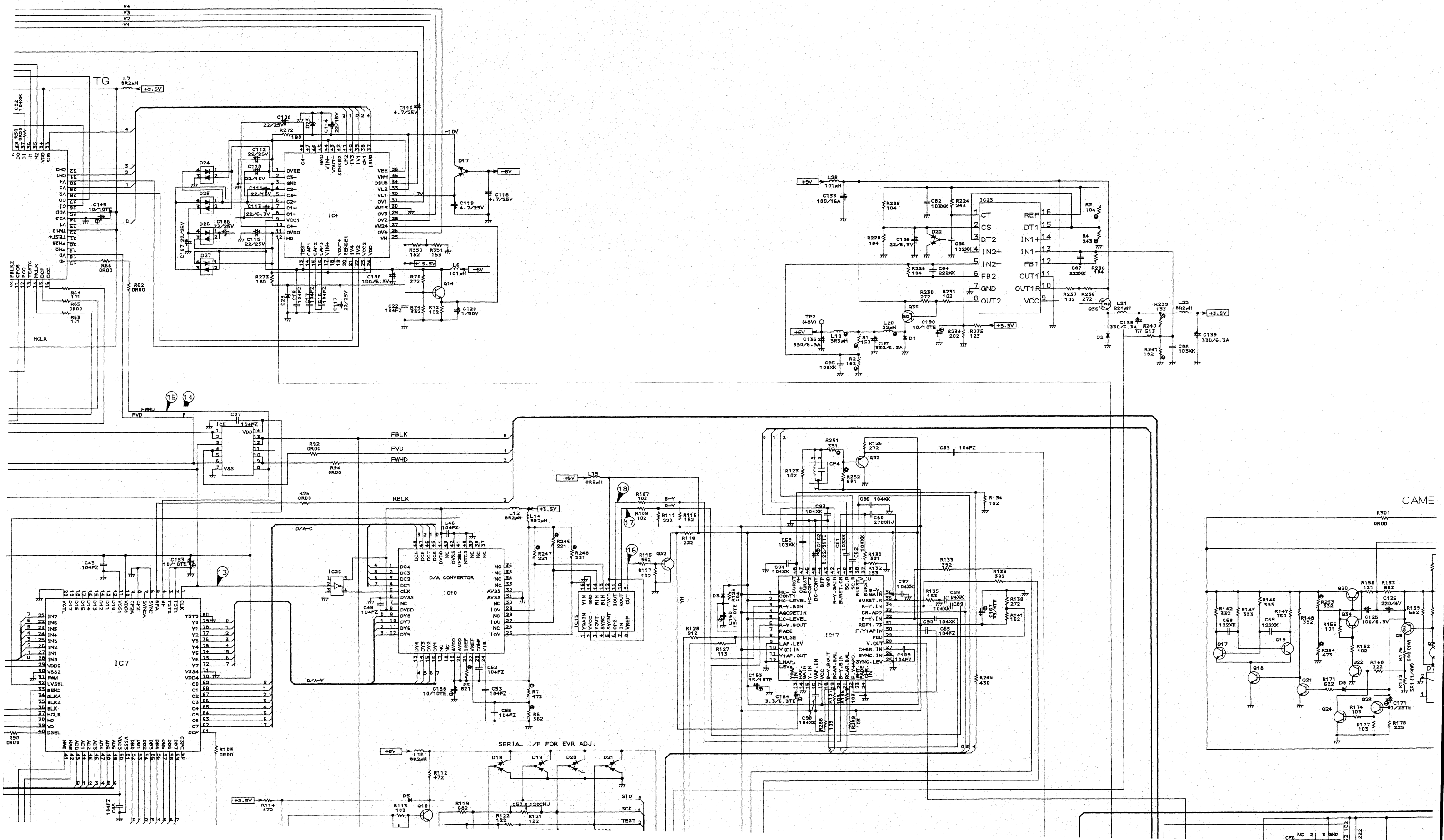


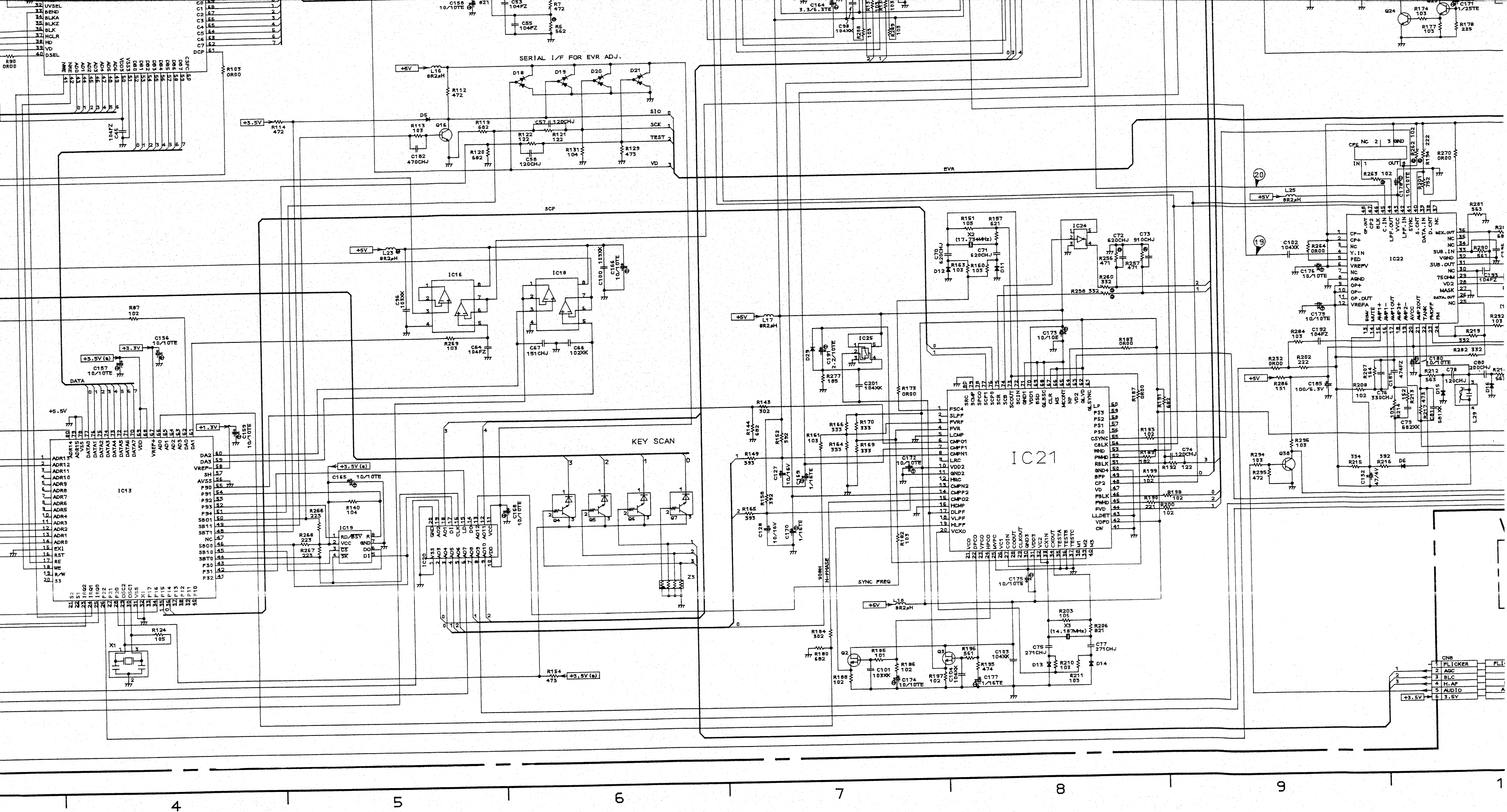
### SCHEMATIC DIAGRAM OF MAIN





# SCHEMATIC DIAGRAM OF MAIN BOARD, SWITCH BOARD, VR BOARD

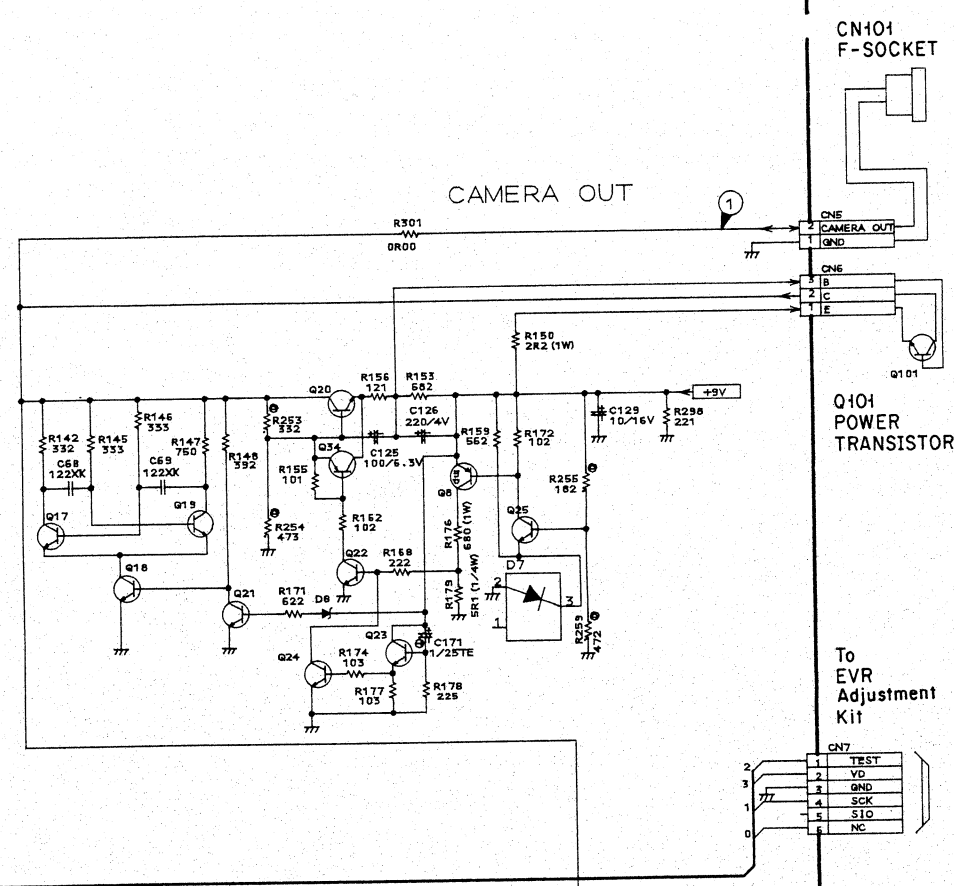
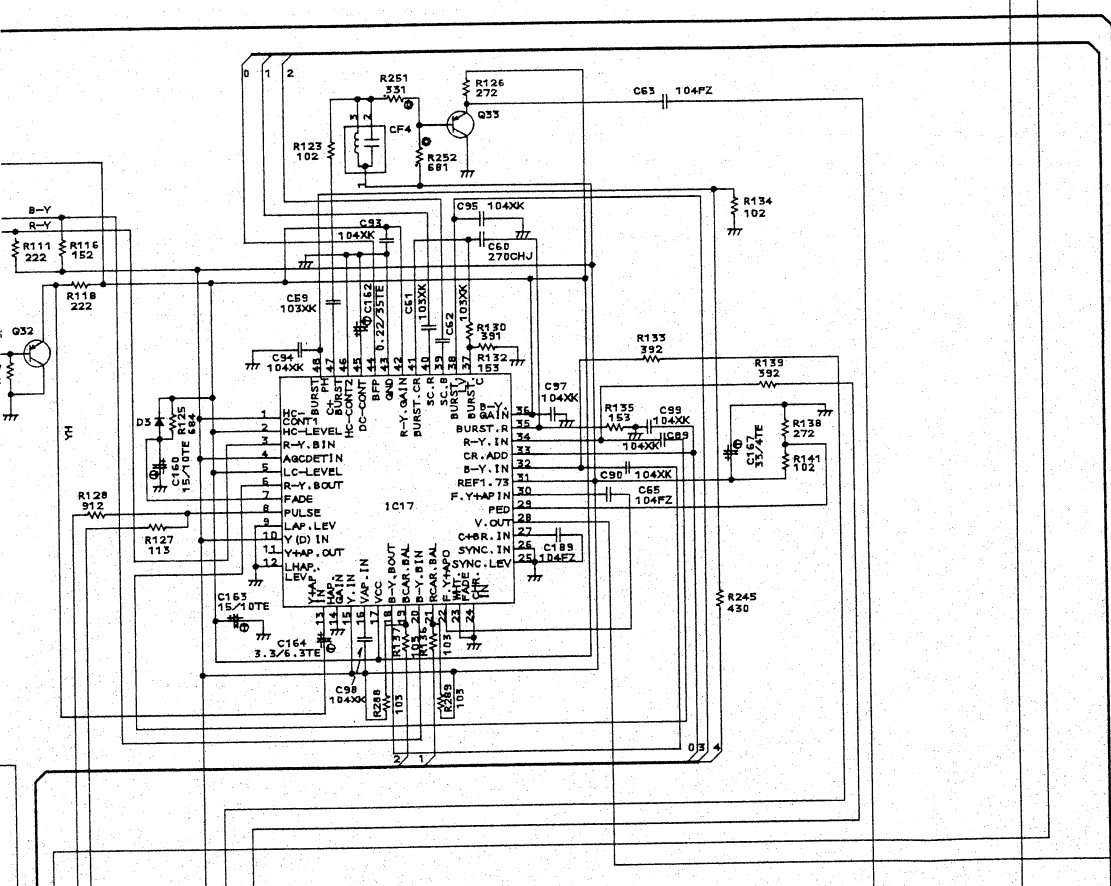
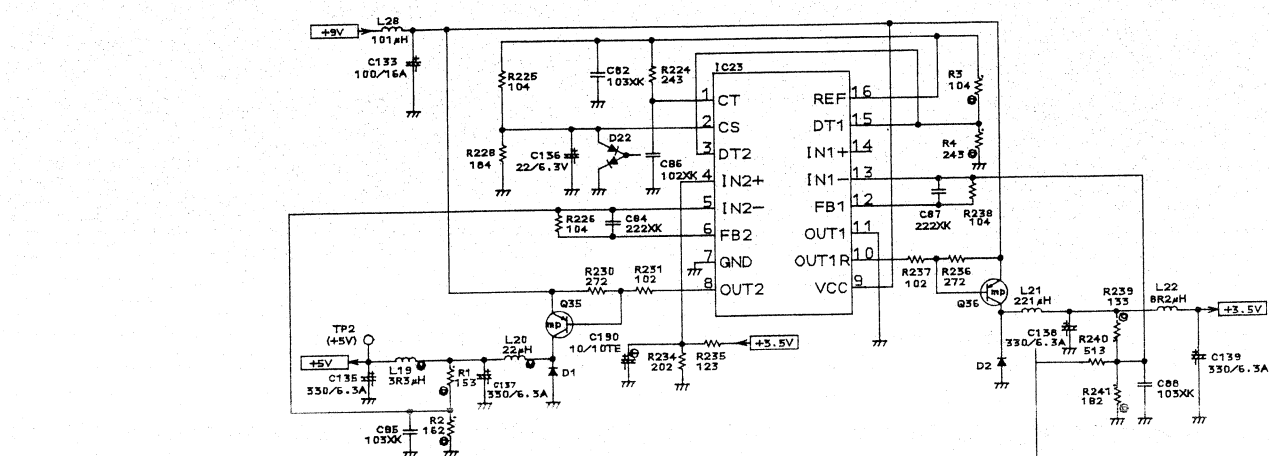




F = 0.001μF

OpF = 0.1μF

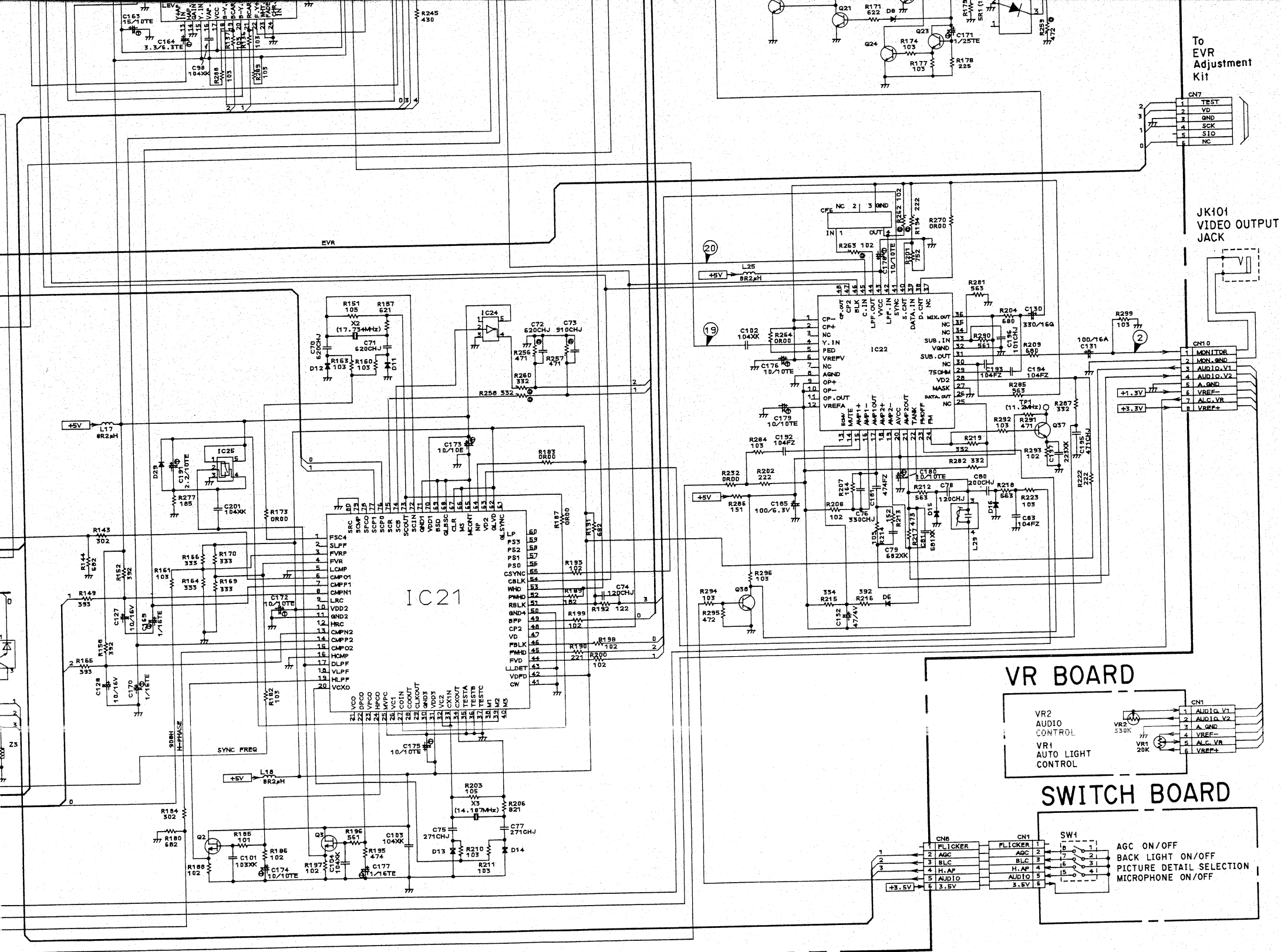
itance indicates



[◀ Index ▶](#)

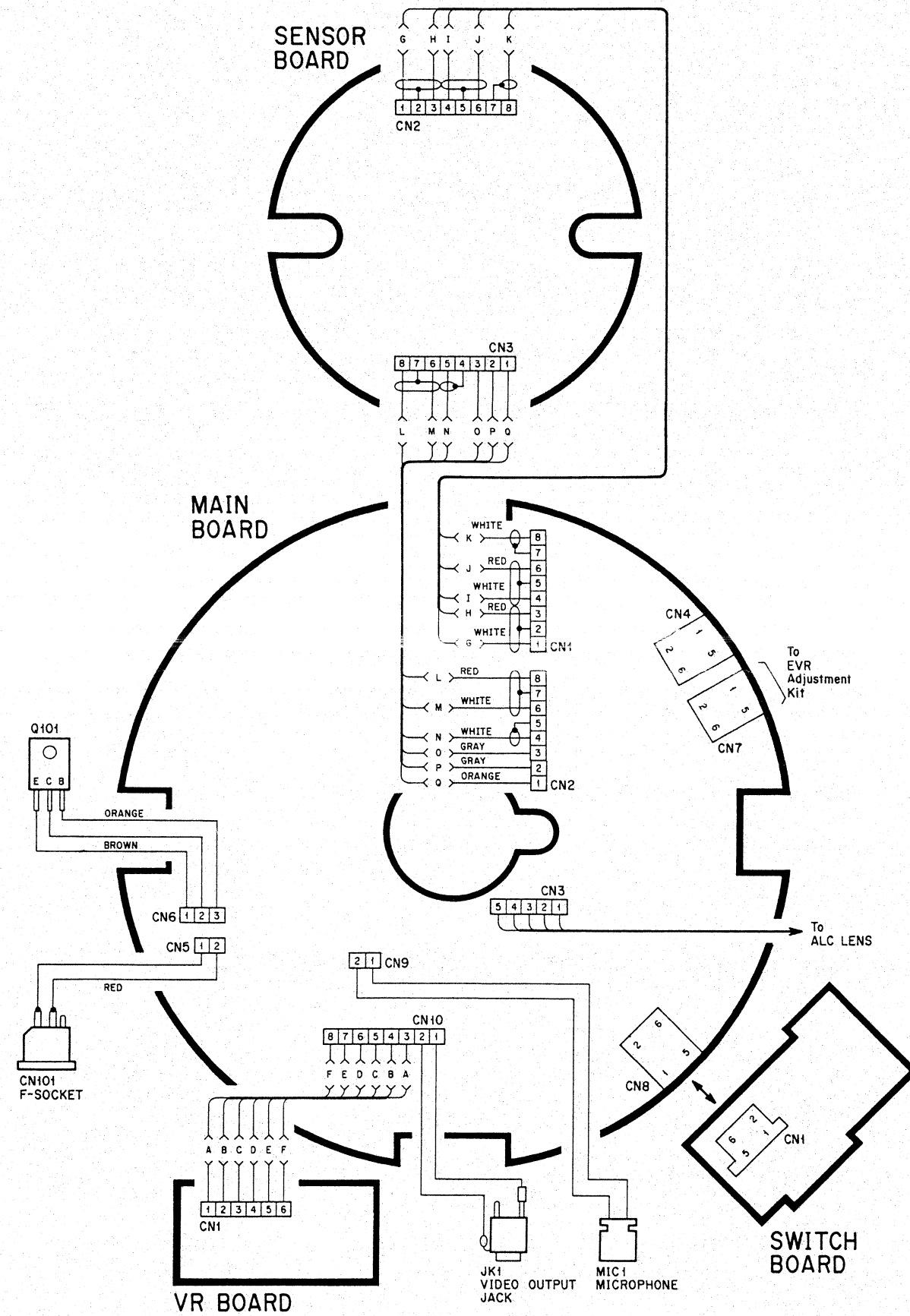
## MAIN BOARD

|      |     |
|------|-----|
| IC1  | G2  |
| IC2  | F2  |
| IC3  | F3  |
| IC4  | F5  |
| IC5  | E4  |
| IC6  | D1  |
| IC7  | D4  |
| IC8  | B2  |
| IC9  | B2  |
| IC10 | D5  |
| IC11 | A2  |
| IC12 | B2  |
| IC13 | B4  |
| IC14 | A2  |
| IC15 | D6  |
| IC16 | C5  |
| IC17 | D7  |
| IC18 | C6  |
| IC19 | B5  |
| IC20 | B5  |
| IC21 | B8  |
| IC22 | C10 |
| IC23 | G8  |
| IC24 | C8  |
| IC25 | B7  |
| IC26 | E5  |
| Q1   | F3  |
| Q2   | A7  |
| Q3   | A7  |
| Q4   | B6  |
| Q5   | B6  |
| Q6   | B6  |
| Q7   | B6  |
| Q8   | D10 |
| Q9   | F1  |
| Q10  | F2  |
| Q11  | F2  |
| Q12  | F1  |
| Q13  | F2  |
| Q14  | F5  |
| Q15  | C1  |
| Q16  | C5  |
| Q17  | D9  |
| Q18  | D9  |
| Q19  | D9  |
| Q20  | D10 |
| Q21  | D9  |
| Q22  | D10 |
| Q23  | D10 |
| Q24  | D10 |
| Q25  | D10 |
| Q26  | E2  |
| Q27  | C1  |
| Q28  | D2  |
| Q29  | B2  |
| Q32  | E6  |
| Q33  | E7  |
| Q34  | D10 |



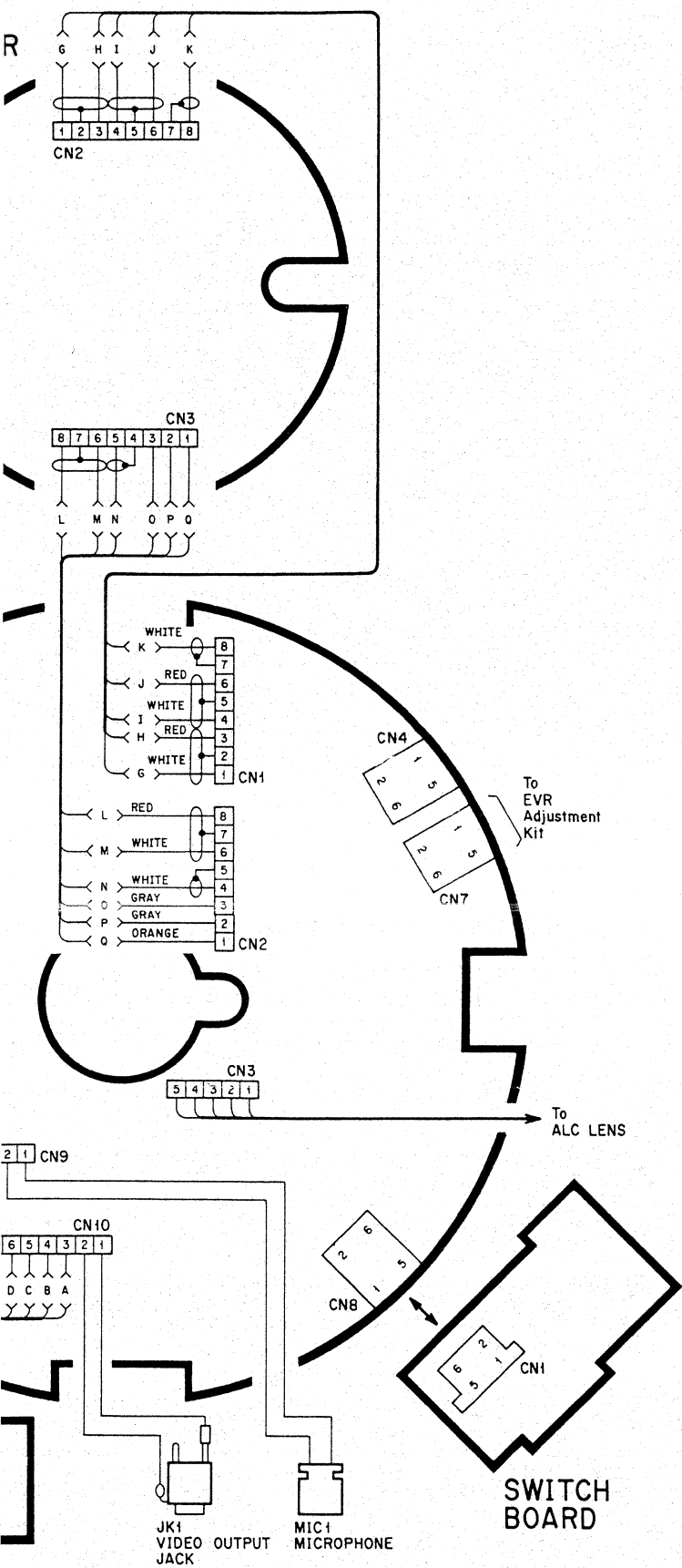
|     |     |
|-----|-----|
| Q23 | D10 |
| Q24 | D10 |
| Q25 | D10 |
| Q26 | E2  |
| Q27 | C1  |
| Q28 | D2  |
| Q29 | B2  |
| Q32 | E6  |
| Q33 | E7  |
| Q34 | D10 |
| Q35 | F8  |
| Q36 | F8  |
| Q37 | B10 |
| Q38 | B9  |
| D1  | F8  |
| D2  | F9  |
| D3  | D7  |
| D4  | G3  |
| D5  | D5  |
| D6  | B10 |
| D7  | D10 |
| D8  | D10 |
| D9  | F3  |
| D10 | F3  |
| D11 | C8  |
| D12 | C8  |
| D13 | A8  |
| D14 | A8  |
| D15 | B10 |
| D16 | B10 |
| D17 | G5  |
| D18 | D6  |
| D19 | D6  |
| D20 | D6  |
| D21 | D6  |
| D22 | G8  |
| D23 | G5  |
| D24 | G4  |
| D25 | F4  |
| D26 | F4  |
| D27 | F4  |
| D28 | F5  |
| D29 | B7  |

# WIRING DIAGRAM

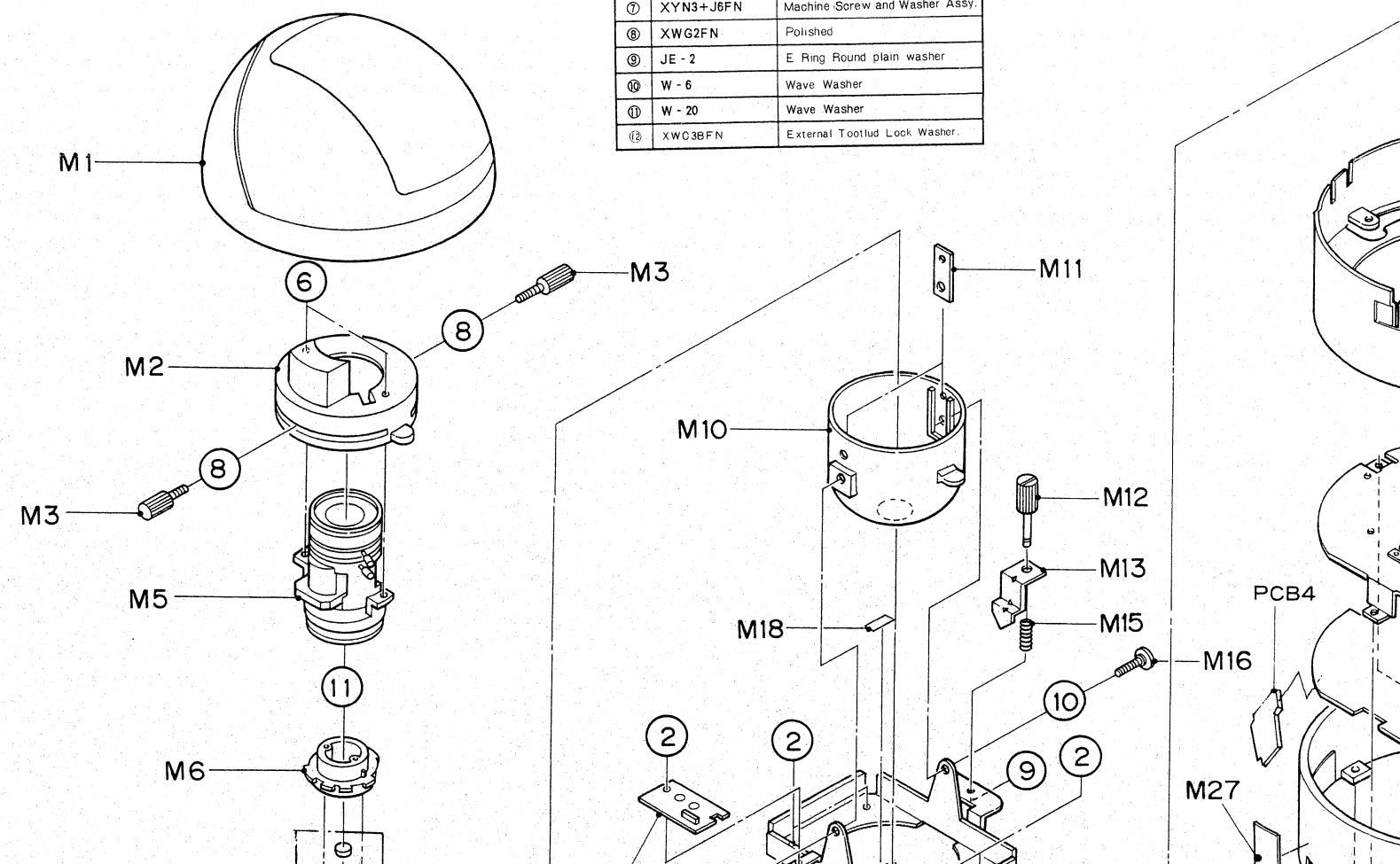




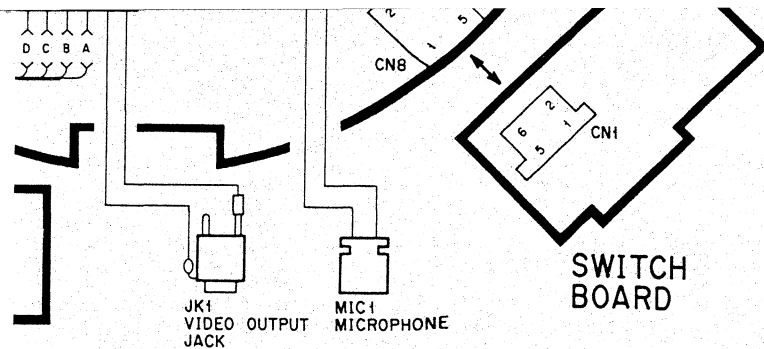
# WIRING DIAGRAM



# EXPLODED VIEW

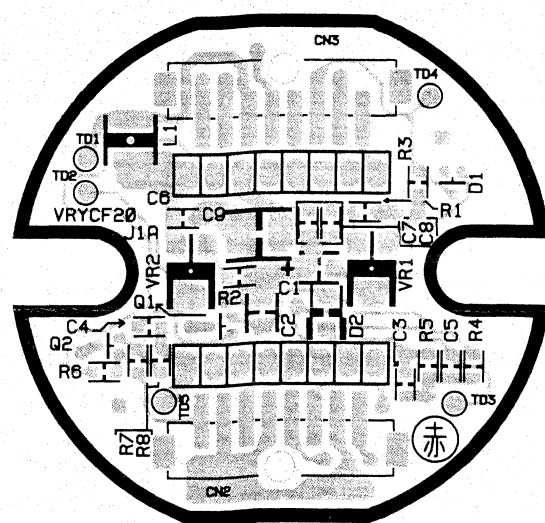


# CONDUCTOR VIEW OF SENSOR BOARD



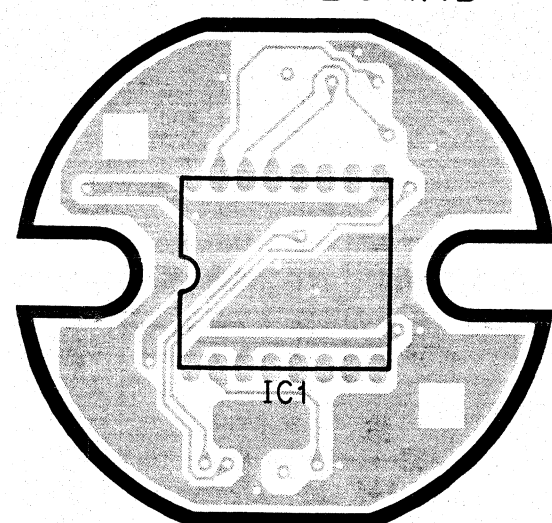
# CONDUCTOR VIEW OF SENSOR BOARD

## SENSOR BOARD

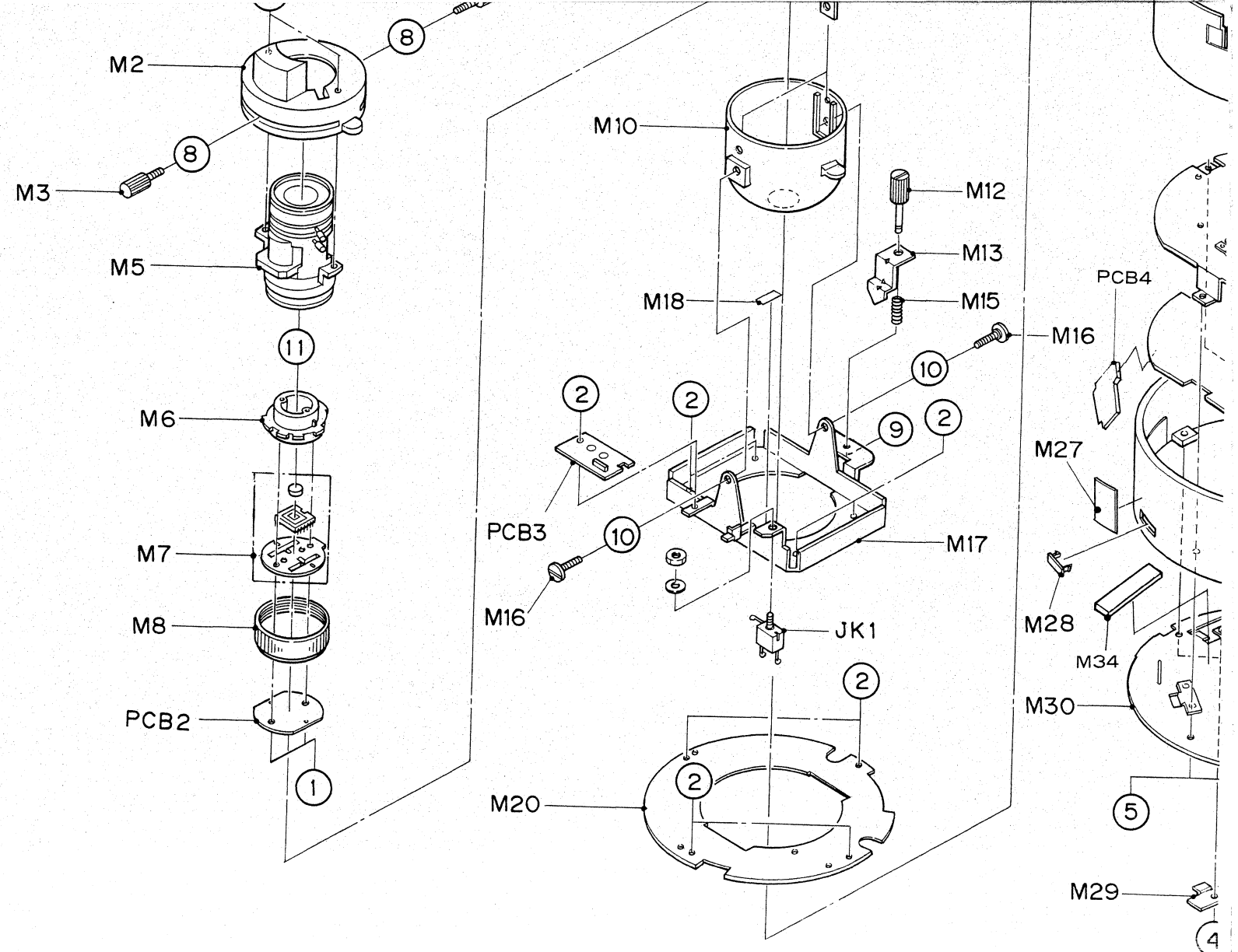


(COMPONENT SIDE)

## SENSOR BOARD



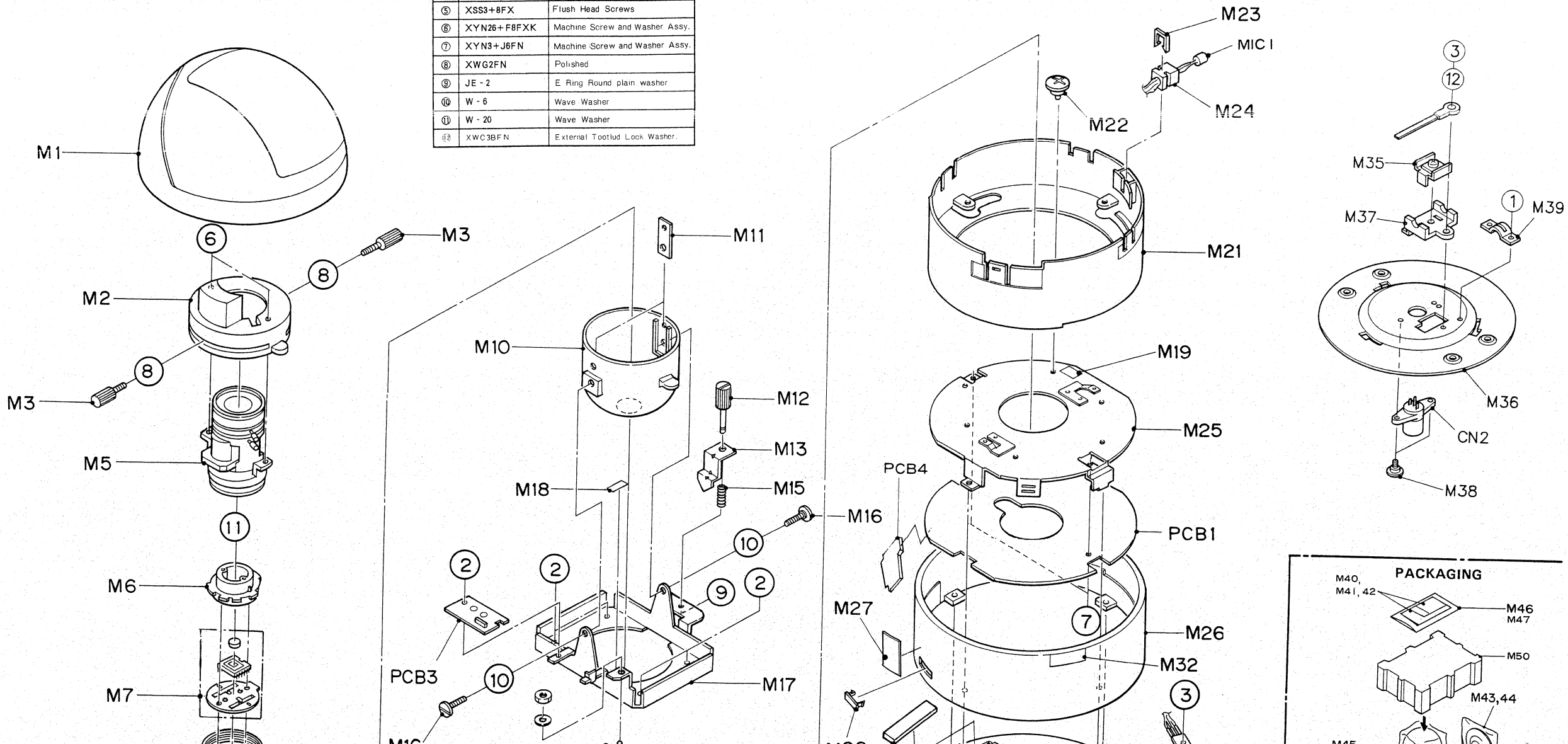
(PATTERN SIDE)

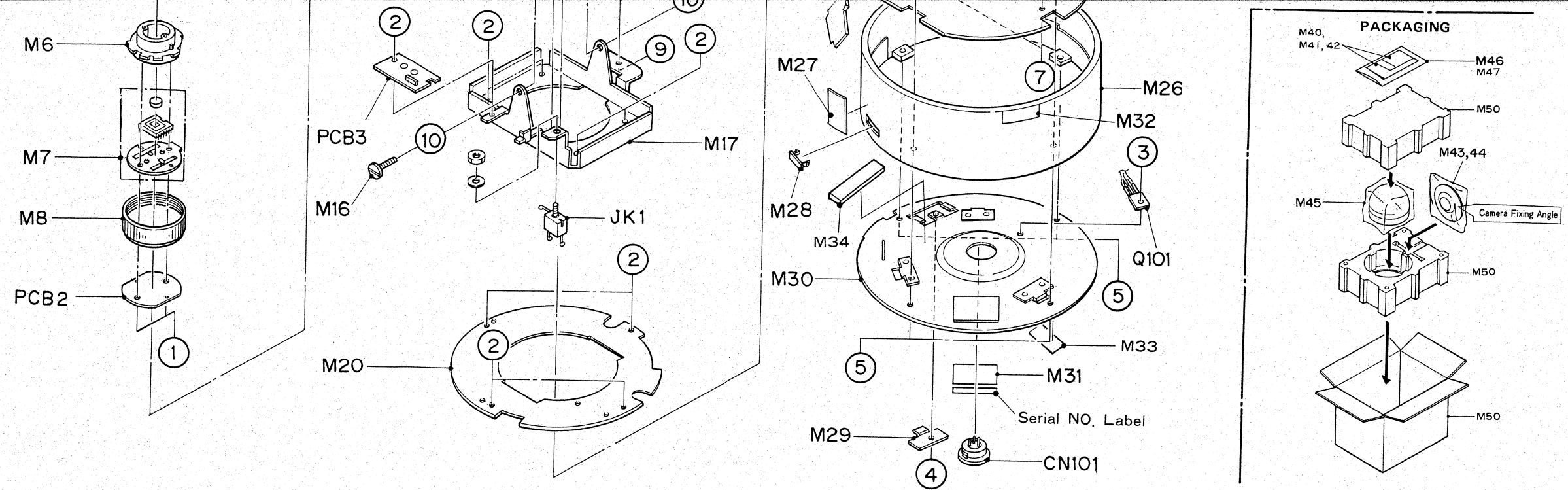


EXPLODED VIEW

○ Numbers Show Screws

| No. | Screws       | Description                    |
|-----|--------------|--------------------------------|
| ①   | XSB2+4FX     | Binding Head Screws            |
| ②   | XSB3+5FXK    | Binding Head Black Screws      |
| ③   | XSB3+6FX     | Binding Head Screws            |
| ④   | 1P2X3.0BC    | Flush Head Screws              |
| ⑤   | XSS3+8FX     | Flush Head Screws              |
| ⑥   | XYN26+ F8FXK | Machine Screw and Washer Assy. |
| ⑦   | XYN3+J6FN    | Machine Screw and Washer Assy. |
| ⑧   | XWG2FN       | Polished                       |
| ⑨   | JE - 2       | E Ring Round plain washer      |
| ⑩   | W - 6        | Wave Washer                    |
| ⑪   | W - 20       | Wave Washer                    |
| ⑫   | XWC3BFN      | External Tooltld Lock Washer.  |





## REPLACEMENT PARTS LIST

## Important Notice

- Components identified by "  $\triangle$  " mark have special characteristics important for safety.  
When replacing any of these components, use only manufacturer's specified parts.
- RTL : Retention Time Limited,

| REF.NO.              | PART NO.     | DESCRIPTION                       | REF.NO.           | PART NO.     | DESCRIPTION                |
|----------------------|--------------|-----------------------------------|-------------------|--------------|----------------------------|
| <b>MISCELLANEOUS</b> |              |                                   | <b>MAIN BOARD</b> |              |                            |
| Q101                 | 2SC1568-RST  | Transistor                        | PCB1 (RTL)        | YWVKZCF20E1A | Printed Circuit Board Assy |
| MIC1                 | WM-60AY      | MIC Assy                          | IC1               | YWTC74VC04F  | IC                         |
| JK101                | YWH5J0289    | Jack                              | IC2               | YWCXA1439M   | IC                         |
| CN101                | YWTCP9105    | F Socket                          | IC3               | MN5190       | IC                         |
| CN102                | YWTCS9117    | 3-pin Connector                   | IC4               | MN3111H      | IC                         |
| M1                   | YWV9AC0683A3 | Dome Cover Assy                   | IC5               | YWTC74VC32F  | IC                         |
| M2                   | YWV3CA0285A3 | Parts Holder                      | IC6               | AN2030FAP    | IC                         |
| M3                   | YWV1EA0267A4 | Case Lock Special Screw           | IC7               | MN6732       | IC                         |
| M5                   | YWX5Z        | Lens                              | IC8               | MN655431SH   | IC                         |
| M6                   | YWV2TA0320A4 | Mounting Bracket                  | IC9               | MN13821      | IC                         |
| M7                   | YWV9BA0025AN | Head Optical Assy                 | IC10              | MN657011H    | IC                         |
| M8                   | YWV3FA0165A4 | Ring                              | IC11              | YWNJM3416    | IC                         |
| M10                  | YWV5KA1305A3 | Camera Case                       | IC12              | MN13821      | IC                         |
| M11                  | YWV1FA0059A4 | Nut Plate for Camera Case         | IC13              | MN1882010CUN | IC                         |
| M12                  | YWV1EA0268A4 | Special Screw for Upper Case Lock | IC14              | YWLM358DB    | IC                         |
| M13                  | YWV2SA2517A4 | Mounting Angle for Turning Lock   | IC15              | AN2040SB     | IC                         |
| M15                  | YWV4JA0364A4 | Lock Shaft Spring                 | IC16              | YWLM358DB    | IC                         |
| M16                  | YWV1EA0201A4 | Special Screw for Case Lock       | IC17              | AN2254FAP    | LSI                        |
| M17                  | YWV2SA2516A3 | Mounting Angle for Camera         | IC18              | YWLM358DB    | IC                         |
| M18                  | YWV7SA1817A4 | Video out Label                   | IC19              | YVBR9021BFE1 | IC                         |
| M19                  | YWV7SA1819A4 | Lock Label                        | IC20              | YWMB88346BEF | IC                         |
| M20                  | YWV6EB0133A3 | Upper Cover                       | IC21              | MN73093      | IC                         |
| M21                  | YWV5KA1306A2 | Turning Case                      | IC22              | YWPC5022G079 | IC                         |
| M22                  | YWV1EA0200A4 | Stopper Screw for Turning Case    | IC23              | YWFA7611M    | IC                         |
| M23                  | YWV5HA0052A4 | Mic Clip                          | IC24              | YWTC7504F    | IC                         |
| M24                  | YWV3CA0226A4 | MIC Holder                        | IC25              | YWTC4S66FR   | IC                         |
| M25                  | YWV9AB0678A3 | Mechanical Chassis Assy           | IC26              | YWTC7504F    | IC                         |
| M26                  | YWV5KA1307A2 | Main Case                         | Q1                | 2SK853       | Transistor                 |
| M27                  | YWV7SA1818A4 | Dip Switch Label                  | Q2,3              | 2SK662-PQR   | FET                        |
| M28                  | YWV5GA0146A4 | Dip Switch Cap                    | Q4-7              | FA3L4ZT1B    | Transistor                 |
| M29                  | YWV6EA0186A4 | Blank Plate                       | Q8                | 2SB766A-QR   | Transistor                 |
| M30                  | YWV9AB0676A3 | Bottom Case Assy                  | Q9                | 2SC4619      | Transistor                 |
| M31 <1>              | YWV7QA3091A4 | Main Label                        | Q10,11            | 2SC4617      | Transistor or              |
| M32                  | YWV7SA1785A4 | OPEN/LOCK Label                   |                   | 2SD2216      | Transistor                 |
| M33                  | YFV7MA0099A4 | Safety Label                      | Q12,13            | 2SC4619      | Transistor                 |
| M34                  | YWV2FA0651A4 | Rubber Cushion                    | Q14               | 2SC4617      | Transistor or              |
| M35                  | YVL467GTM049 | Electrode                         |                   | 2SD2216      | Transistor                 |
| M36                  | YWV6FA0114A3 | Bracket                           | Q15               | 2SC4617      | Transistor or              |
| M37                  | YWV2PA0437A4 | Insulator                         |                   | 2SD2216      | Transistor                 |
| M38                  | YWV1EA0202A4 | Special Screw                     | Q16               | 2SC4617      | Transistor or              |
| M39                  | YFV2GA0008A4 | Cord Clamp                        |                   | 2SD2216      | Transistor                 |
|                      |              |                                   | Q17               | 2SD1819-QRS  | Transistor                 |
|                      |              |                                   | Q18,19            | 2SD1820-QRS  | Transistor                 |
|                      |              |                                   | Q20-22            | 2SD1819-QRS  | Transistor                 |

| REF.NO. | PART NO.     | DESCRIPTION   |                 | REF.NO.  | PART NO.    | DESCRIPTION |                 |
|---------|--------------|---------------|-----------------|----------|-------------|-------------|-----------------|
| Q23,24  | 2SC4617      | Transistor or |                 | R36,37   | ERJ3GEYJ101 | Carbon      | 100 ohms 1/16W  |
| Q25     | 2SD2216      | Transistor    |                 | R40,41   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| Q26-29  | 2SD1819-QRS  | Transistor    |                 | R43      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| Q32,33  | 2SB1462      | Transistor    |                 | R44      | ERJ3GEYJ101 | Carbon      | 100 ohms 1/16W  |
|         | 2SB1462      | Transistor    |                 | R45,46   | ERJ3GEY0R00 | Carbon      |                 |
| Q34     | 2SA1576      | Transistor or |                 | R47      | ERJ3GEYJ101 | Carbon      | 100 ohms 1/16W  |
|         | 2SB1218A-QR  | Transistor    |                 | R48,49   | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |
| Q35,36  | 2SB766A-QR   | Transistor    |                 | R50,51   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| Q37     | 2SC4619      | Transistor    |                 | R54      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| Q38     | 2SC4617      | Transistor or |                 | R55,58   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
|         | 2SD2216      | Transistor    |                 | R60      | ERJ3GEYJ302 | Carbon      | 3K ohms 1/16W   |
| D1,2    | YWSC80206L   | Diode         |                 | R61      | ERJ3GEYJ752 | Carbon      | 7.5K ohms 1/16W |
| D3      | YWDA121      | Diode or      |                 | R62      | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
|         | MA132K       | Diode         |                 | R63,64   | ERJ3GEYJ101 | Carbon      | 100 ohms 1/16W  |
| D4      | YWDA121      | Diode or      |                 | R65,66   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
|         | MA132K       | Diode         |                 | R67      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| D5      | MA729        | Diode         |                 | R69      | ERJ3GEYJ181 | Carbon      | 180 ohms 1/16W  |
| D6      | MA141K       | Diode         |                 | R70      | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W |
| D7      | YWRD6R2MB1   | Diode         |                 | R71      | ERJ3GEYJ562 | Carbon      | 5.6K ohms 1/16W |
| D8      | MA8051       | Diode         |                 | R72      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| D9-14   | MA372        | Diode         |                 | R73      | ERJ3GEYJ562 | Carbon      | 5.6K ohms 1/16W |
| D15,16  | MA338        | Diode         |                 | R74      | ERJ3GEYJ202 | Carbon      | 2K ohms 1/16W   |
| D17-21  | YWDA221      | Diode         |                 | R75      | ERJ3GEYJ821 | Carbon      | 820 ohms 1/16W  |
| D22     | MA143        | Diode         |                 | R76      | ERJ3GEYJ511 | Carbon      | 510 ohms 1/16W  |
| D23     | MA8100       | Diode         |                 | R77      | ERJ3GEYJ181 | Carbon      | 180 ohms 1/16W  |
| D24-26  | MA726        | Diode         |                 | R78,79   | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |
| D27     | MA726        | Diode         |                 | R80      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| D28     | MA8150       | Diode         |                 | R81      | ERJ3GEYJ272 | Carbon      | 2.7K ohms 1/16W |
| D29     | YWDA121      | Diode         |                 | R82      | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |
|         | MA132K       | Diode         |                 | R84      | ERJ3GEYJ222 | Carbon      | 2.2K ohms 1/16W |
| R1      | YWR0816P153D | Metal         | 15K ohms 1/16W  | R85      | ERJ3GEYJ152 | Carbon      | 1.5K ohms 1/16W |
| R2      | YWR0816P162D | Metal         | 1.6K ohms 1/16W | R86      | ERJ3GEYJ122 | Carbon      | 1.2K ohms 1/16W |
| R3      | YWR0816R104D | Metal         | 100K ohms 1/16W | R87      | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| R4      | YWR0816P243D | Metal         | 24K ohms 1/16W  | R88-90   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| R5      | YWR0816P821D | Metal         | 820 ohms 1/16W  | R92      | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| R6      | YWR0816P562D | Metal         | 5.6K ohms 1/16W | R93      | ERJ3GEYJ472 | Carbon      | 4.7K ohms 1/16W |
| R7      | YWR0816P472D | Metal         | 4.7K ohms 1/16W | R94,95   | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| R8-10   | ERJ3GEYJ270  | Carbon        | 27 ohms 1/6W    | R96      | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |
| R13     | ERJ3GEYJ102  | Carbon        | 1K ohms 1/16W   | R97      | ERJ3GEYJ104 | Carbon      | 100K ohms 1/16W |
| R14     | ERJ3GEYJ392  | Carbon        | 3.9K ohms 1/16W | R98      | ERJ3GEYJ473 | Carbon      | 47K ohms 1/16W  |
| R15     | ERJ3GEYJ101  | Carbon        | 100 ohms 1/16W  | R99      | ERJ3GEYJ152 | Carbon      | 1.5K ohms 1/16W |
| R16     | ERJ3GEYJ202  | Carbon        | 2K ohms 1/16W   | R100     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| R17     | ERJ3GEYJ102  | Carbon        | 1K ohms 1/16W   | R101     | ERJ3GEYJ153 | Carbon      | 15K ohms 1/16W  |
| R18     | ERJ3GEY0R00  | Carbon        | 0 ohms 1/16W    | R103     | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| R20     | ERJ3GEYJ560  | Carbon        | 56 ohms 1/16W   | R104     | ERJ3GEYJ473 | Carbon      | 47K ohms 1/16W  |
| R23     | ERJ3GEYJ911  | Carbon        | 910 ohms 1/16W  | R105     | ERJ3GEYJ154 | Carbon      | 150K ohms 1/16W |
| R24     | ERJ3GEYJ202  | Carbon        | 2K ohms 1/16W   | R106     | ERJ3GEY0R00 | Carbon      | 0 ohms 1/16W    |
| R25     | ERJ3GEYJ102  | Carbon        | 1K ohms 1/16W   | R107,109 | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |
| R26     | ERJ3GEYJ911  | Carbon        | 910 ohms 1/16W  | R111     | ERJ3GEYJ222 | Carbon      | 2.2K ohms 1/16W |
| R27     | ERJ3GEY0R00  | Carbon        | 0 ohms 1/16W    | R112     | ERJ3GEYJ472 | Carbon      | 4.7K ohms 1/16W |
| R28     | ERJ3GEYJ102  | Carbon        | 1K ohms 1/16W   | R113     | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |
| R29     | ERJ3GEYJ912  | Carbon        | 9.1K ohms 1/16W | R114     | ERJ3GEYJ472 | Carbon      | 4.7K ohms 1/16W |
| R30,32  | ERJ3GEYJ472  | Carbon        | 4.7K ohms 1/16W | R115     | ERJ3GEYJ562 | Carbon      | 5.6K ohms 1/16W |
| R33     | ERJ3GEY0R00  | Carbon        | 0 ohms 1/16W    | R116     | ERJ3GEYJ152 | Carbon      | 1.5K ohms 1/16W |
| R35     | ERJ3GEYJ472  | Carbon        | 4.7K ohms 1/16W | R117     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   |

| REF.NO.  | PART NO.    | DESCRIPTION |                 | REF.NO.  | PART NO.     | DESCRIPTION |                 |
|----------|-------------|-------------|-----------------|----------|--------------|-------------|-----------------|
| R118     | ERJ3GEYJ222 | Carbon      | 2.2K ohms 1/16W | R182     | ERJ3GEYJ103  | Carbon      | 10K ohms 1/16W  |
| R119,120 | ERJ3GEYJ682 | Carbon      | 6.8K ohms 1/16W | R183     | ERJ3GEY0R00  | Carbon      | 0 ohms 1/16W    |
| R121,122 | ERJ3GEYJ122 | Carbon      | 1.2K ohms 1/16W | R184     | ERJ3GEYJ302  | Carbon      | 3K ohms 1/16W   |
| R123     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   | R185     | ERJ3GEYJ101  | Carbon      | 100 ohms 1/16W  |
| R124     | ERJ3GEYJ105 | Carbon      | 1M ohms 1/16W   | R186     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R125     | ERJ3GEYJ684 | Carbon      | 680K ohms 1/16W | R187     | ERJ3GEY0R00  | Carbon      | 0 ohms 1/16W    |
| R126     | ERJ3GEYJ272 | Carbon      | 2.7K ohms 1/16W | R188     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R127     | ERJ3GEYJ113 | Carbon      | 11K ohms 1/16W  | R189     | ERJ3GEYJ182  | Carbon      | 1.8K ohms 1/16W |
| R128     | ERJ3GEYJ912 | Carbon      | 9.1K ohms 1/16W | R190     | ERJ3GEYJ221  | Carbon      | 220 ohms 1/16W  |
| R129     | ERJ3GEYJ473 | Carbon      | 47K ohms 1/16W  | R191     | ERJ3GEYJ682  | Carbon      | 6.8K ohms 1/16W |
| R130     | ERJ3GEYJ391 | Carbon      | 390 ohms 1/16W  | R192     | ERJ3GEYJ122  | Carbon      | 1.2K ohms 1/16W |
| R131     | ERJ3GEYJ104 | Carbon      | 100K ohms 1/16W | R193     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R132     | ERJ3GEYJ153 | Carbon      | 15K ohms 1/16W  | R194     | YWR0816P222D | Metal       | 2.2K ohms 1/16W |
| R133     | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W | R195     | ERJ3GEYJ474  | Carbon      | 470K ohms 1/16W |
| R134     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   | R196     | ERJ3GEYJ561  | Carbon      | 560 ohms 1/16W  |
| R135     | ERJ3GEYJ153 | Carbon      | 15K ohms 1/16W  | R197-200 | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R136,137 | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  | R201     | YWR0816P752D | Metal       | 7.5K ohms 1/16W |
| R138     | ERJ3GEYJ272 | Carbon      | 2.7K ohms 1/16W | R202     | ERJ3GEYJ222  | Carbon      | 2.2K ohms 1/16W |
| R139     | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W | R203     | ERJ3GEYJ105  | Carbon      | 1M ohms 1/16W   |
| R140     | ERJ3GEYJ104 | Carbon      | 100K ohms 1/16W | R204     | ERJ14YJ680   | Carbon      | 68 ohms 1/4W    |
| R141     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   | R206     | ERJ3GEYJ821  | Carbon      | 820 ohms 1/16W  |
| R142     | ERJ3GEYJ332 | Carbon      | 3.3K ohms 1/16W | R207     | ERJ3GEYJ164  | Carbon      | 160K ohms 1/16W |
| R143     | ERJ3GEYJ302 | Carbon      | 3K ohms 1/16W   | R208     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R144     | ERJ3GEYJ682 | Carbon      | 6.8K ohms 1/16W | R209     | ERJ14YJ680   | Carbon      | 68 ohms 1/4W    |
| R145,146 | ERJ3GEYJ333 | Carbon      | 33K ohms 1/16W  | R210,211 | ERJ3GEYJ103  | Carbon      | 10K ohms 1/16W  |
| R147     | ERJ3GEYJ750 | Carbon      | 75 ohms 1/16W   | R212     | ERJ3GEYJ563  | Carbon      | 56K ohms 1/16W  |
| R148     | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W | R213     | ERJ3GEYJ152  | Carbon      | 1.5K ohms 1/16W |
| R149     | ERJ3GEYJ393 | Carbon      | 39K ohms 1/16W  | R214     | ERJ3GEYJ103  | Carbon      | 10K ohms 1/16W  |
| R150     | ERJ1WYJ2R2  | Carbon      | 2.2 ohms 1W     | R215     | ERJ3GEYJ334  | Carbon      | 330K 1/16W      |
| R151     | ERJ3GEYJ105 | Carbon      | 1M ohms 1/16W   | R216     | ERJ3GEYJ392  | Carbon      | 3.9K ohms 1/16W |
| R152     | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W | R217     | ERJ3GEYJ473  | Carbon      | 47K ohms 1/16W  |
| R153     | ERJ3GEYJ682 | Carbon      | 6.8K ohms 1/16W | R218     | ERJ3GEYJ563  | Carbon      | 56K ohms 1/16W  |
| R154     | ERJ3GEYJ473 | Carbon      | 47K ohms 1/16W  | R219     | ERJ3GEYJ332  | Carbon      | 3.3K ohms 1/16W |
| R155     | ERJ3GEYJ101 | Carbon      | 100 ohms 1/16W  | R222     | ERJ3GEYJ222  | Carbon      | 2.2K ohms 1/16W |
| R156     | ERJ3GEYJ121 | Carbon      | 120 ohms 1/16W  | R223     | ERJ3GEYJ103  | Carbon      | 10K ohms 1/16W  |
| R157     | ERJ3GEYJ621 | Carbon      | 620 ohms 1/16W  | R224     | YWR0816P243D | Metal       | 24K ohms 1/16W  |
| R158     | ERJ3GEYJ392 | Carbon      | 3.9K ohms 1/16W | R225,226 | ERJ3GEYJ104  | Carbon      | 100K ohms 1/16W |
| R159     | ERJ3GEYJ562 | Carbon      | 5.6K ohms 1/16W | R227     | ERJ3GEY0R00  | Carbon      | 0 ohms 1/16W    |
| R160,161 | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  | R228     | ERJ3GEYJ184  | Carbon      | 180K ohms 1/16W |
| R162     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   | R230     | ERJ3GEYJ272  | Carbon      | 2.7K ohms 1/16W |
| R163     | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  | R231     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R164     | ERJ3GEYJ333 | Carbon      | 33K ohms 1/16W  | R232,233 | ERJ3GEY0R00  | Carbon      | 0 ohms 1/16W    |
| R165     | ERJ3GEYJ393 | Carbon      | 39K ohms 1/16W  | R234     | YWR0816P202D | Metal       | 2K ohms 1/16W   |
| R166     | ERJ3GEYJ333 | Carbon      | 33K ohms 1/16W  | R235     | YWR0816P123D | Metal       | 12K ohms 1/16W  |
| R168     | ERJ3GEYJ222 | Carbon      | 2.2K ohms 1/16W | R236     | ERJ3GEYJ272  | Carbon      | 2.7K ohms 1/16W |
| R169,170 | ERJ3GEYJ333 | Carbon      | 33K ohms 1/16W  | R237     | ERJ3GEYJ102  | Carbon      | 1K ohms 1/16W   |
| R171     | ERJ3GEYJ622 | Carbon      | 6.2K ohms 1/16W | R238     | ERJ3GEYJ104  | Carbon      | 100K ohms 1/16W |
| R172     | ERJ3GEYJ102 | Carbon      | 1K ohms 1/16W   | R239     | YWR0816P133D | Metal       | 13K ohms 1/16W  |
| R173     | ERJ3GEY0R00 | Carbon      | 0K ohms 1/16W   | R240     | ERJ3GEYJ513  | Carbon      | 51K ohms 1/16W  |
| R174     | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  | R241     | YWR0816P182D | Metal       | 1.8K ohms 1/16W |
| R176     | ERJ1WYJ680  | Carbon      | 68 ohms 1W      | R242     | ERJ3GEYJ101  | Carbon      | 100 ohms 1/16W  |
| R177     | ERJ3GEYJ103 | Carbon      | 10K ohms 1/16W  |          |              |             |                 |
| R178     | ERJ3GEYJ225 | Carbon      | 2.2M ohms 1/16W |          |              |             |                 |
| R179     | ERJ14YJ5R1  | Carbon      | 5.1 ohms 1/4W   |          |              |             |                 |
| R180     | ERJ3GEYJ682 | Carbon      | 6.8K ohms 1/16W |          |              |             |                 |

| REF.NO.  | PART NO.     | DESCRIPTION    |                 | REF.NO.  | PART NO.     | DESCRIPTION  |                |
|----------|--------------|----------------|-----------------|----------|--------------|--------------|----------------|
| R243,244 | ERJ6GEY0R00  | Carbon         | 0 ohms 1/10W    | C14      | YW5X102K5VB  | Ceramic      | 1000 pF        |
| R245     | YF2116431JT  | Carbon         | 430 ohms 1/10W  | C15      | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R246-248 | YWR0816P221D | Metal          | 220 ohms 1/16W  | C16-18   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R249,250 | YWR0816P103D | Metal          | 10K ohms 1/16W  | C22-29   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R251     | YWR0816P331D | Metal          | 330 ohms 1/16W  | C30-32   | YW5X103K2VB  | Ceramic      | 0.01 F $\mu$   |
| R252     | YWR0816P681D | Metal          | 680 ohms 1/16W  | C33,34   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R253     | YWR0816P332D | Metal          | 3.3K ohms 1/16W | C38,39   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R254     | YWR0816R473D | Metal          | 47K ohms 1/16W  | C43      | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R255     | YWR0816P182D | Metal          | 1.8K ohms 1/16W | C44      | YW5F473Z2VB  | Ceramic      | 0.047 $\mu$ F  |
| R256,257 | YWR0816P471D | Metal          | 470 ohms 1/16W  | C45,46   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R258     | YWR0816P332D | Metal          | 3.3K ohms 1/16W | C48,49   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R259     | YWR0816P472D | Metal          | 4.7K ohms 1/16W | C50      | YW5X222K5VB  | Ceramic      | 2200 pF        |
| R260     | YWR0816P332D | Metal          | 3.3K ohms 1/16W | C52-56   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R262,263 | YWR0816P102D | Metal          | 1K ohms 1/16W   | C57,58   | YW5CH120J5VB | Ceramic      | 12 pF          |
| R264     | ERJ3GEY0R00  | Carbon         | 0 ohms 1/16W    | C59      | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R266-268 | ERJ3GEYJ223  | Carbon         | 22K ohms 1/16W  | C60      | YW5CH270J5VB | Ceramic      | 27 pF          |
| R269     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C61,62   | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R270     | ERJ3GEY0R00  | Carbon         | 0 ohms 1/16W    | C63-65   | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R272,273 | ERJ3GEYJ180  | Carbon         | 18 ohms 1/16W   | C66      | YW5X102K5VB  | Ceramic      | 1000 pF        |
| R276     | ERJ3GEY0R00  | Carbon         | 0 ohms 1/16W    | C67      | YW5CH151J5VB | Ceramic      | 150 pF         |
| R277     | ERJ3GEYJ185  | Carbon         | 1M ohms 1/16W   | C68,69   | YW5X122K5VB  | Ceramic      | 1200 pF        |
| R281     | ERJ3GEYJ563  | Carbon         | 56K ohms 1/16W  | C70-72   | YW5CH620J5VB | Ceramic      | 62 pF          |
| R282     | ERJ3GEYJ682  | Carbon         | 6.8K ohms 1/16W | C73      | YW5CH910J5VB | Ceramic      | 91 pF          |
| R283     | ERJ3GEY0R00  | Carbon         | 0 ohms 1/16W    | C74      | YW5CH120J5VB | Ceramic      | 12 pF          |
| R284     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C75      | YW5CH271J5VB | Ceramic      | 270 pF         |
| R285     | ERJ3GEYJ563  | Carbon         | 56K ohms 1/16W  | C76      | YW5CH330J5VB | Ceramic      | 33 pF          |
| R286     | ERJ3GEYJ151  | Carbon         | 150 ohms 1/16W  | C77      | YW5CH271J5VB | Ceramic      | 270 pF         |
| R287     | ERJ3GEYJ332  | Carbon         | 3.3K ohms 1/16W | C78      | YW5CH120J5VB | Ceramic      | 12 pF          |
| R288,289 | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C79      | YW5X682K2VB  | Ceramic      | 6800 pF        |
| R290     | ERJ3GEYJ561  | Carbon         | 560 ohms 1/16W  | C80      | YW5CH200J5VB | Ceramic      | 20 pF          |
| R291     | ERJ3GEYJ471  | Carbon         | 470 ohms 1/16W  | C81      | YW5X681K5VB  | Ceramic      | 680 pF         |
| R292     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C82      | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R293     | ERJ3GEYJ102  | Carbon         | 1K ohms 1/16W   | C83      | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F    |
| R294     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C84      | YW5X222K5VB  | Ceramic      | 2200 pF        |
| R295     | ERJ3GEYJ472  | Carbon         | 4.7K ohms 1/16W | C85      | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R296     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C86      | YW5X102K5VB  | Ceramic      | 1000 pF        |
| R298     | ERJ1WYJ221   | Carbon         | 220 ohms 1W     | C87      | YW5X222K5VB  | Ceramic      | 2200 pF        |
| R299     | ERJ3GEYJ103  | Carbon         | 10K ohms 1/16W  | C88      | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| R300     | ERJ3GEY0R00  | Carbon         | 0 ohms 1/16W    | C89-95   | YF400104FZT  | Ceramic      | 0.1 $\mu$ F    |
| R301     | ERJ8GCS0R00  | Carbon         | 0 ohms 1/16W    | C96      | YF400103XKT  | Ceramic      | 0.01 $\mu$ F   |
| R350     | ERJ3GEYJ162  | Carbon         | 1.6K ohms 1/16W | C97-99   | YF400104FZT  | Ceramic      | 0.1 $\mu$ F    |
| R351     | ERJ3GEYJ153  | Carbon         | 15K ohms 1/16W  | C100     | YF400103XKT  | Ceramic      | 0.01 $\mu$ F   |
| Z1,2     | EXBV8V470J   | Block Resistor |                 | C101     | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F   |
| Z3       | EXBV8V103J   | Block Resistor |                 | C102-104 | YF400104FZT  | Ceramic      | 0.1 $\mu$ F    |
| C4       | YW5X102K5VB  | Ceramic        | 1000 pF         | C105     | ECEV1CV470   | Electrolytic | 47 $\mu$ F 16V |
| C5       | YW5CH070J5VB | Ceramic        | 7 pF            | C106,107 | ECEV1CV100   | Electrolytic | 10 $\mu$ F 16V |
| C7       | YW5CH100J5VB | Ceramic        | 10 pF           | C108     | ECEV1EV220   | Electrolytic | 22 $\mu$ F 25V |
| C8       | YW5CH101J5VB | Ceramic        | 100 pF          | C109     | ECEV1HV2R2   | Electrolytic | 22 $\mu$ F 50V |
| C9       | YW5CH100J5VB | Ceramic        | 10 pF           | C110,111 | ECEV1CV220   | Electrolytic | 22 $\mu$ F 16V |
| C10      | YW5X103K2VB  | Ceramic        | 0.01 $\mu$ F    | C112     | ECEV1EV220   | Electrolytic | 22 $\mu$ F 25V |
| C11,12   | YW5CH331J5VB | Ceramic        | 330 pF          |          |              |              |                |
| C13      | YW5F104Z2VB  | Ceramic        | 0.1 $\mu$ F     |          |              |              |                |

| REF.NO.  | PART NO.     | DESCRIPTION  |                  | REF.NO. | PART NO.     | DESCRIPTION        |             |
|----------|--------------|--------------|------------------|---------|--------------|--------------------|-------------|
| C113     | ECEV0JV220   | Electrolytic | 22 $\mu$ F 6.3V  | L3      | ELJSC101KB   | Coil               | 100 $\mu$ H |
| C114     | ECEV1CV220   | Electrolytic | 22 $\mu$ F 16V   | L4      | EIC4EJ008    | Coil               |             |
| C115     | ECEV1EV220   | Electrolytic | 22 $\mu$ F 25V   | L5      | ELJFC8R2MF   | Coil               | 8.2 $\mu$ H |
| C116     | ECEV1EV4R7   | Electrolytic | 4.7 $\mu$ F 25V  | L6      | ELJFB101KB   | Coil               | 100 $\mu$ H |
| C117     | ECEV1EV220   | Electrolytic | 22 $\mu$ F 25V   | L7-18   | ELJFC8R2MF   | Coil               | 8.2 $\mu$ H |
| C118,119 | ECEV1EV4R7   | Electrolytic | 4.7 $\mu$ F 25V  | L19     | YWNL453R3J   | Coil               | 3.3 $\mu$ H |
| C120     | ECEV1HV010   | Electrolytic | 1 $\mu$ F 50V    | L20,21  | YWCDR74221MC | Coil               | 220 $\mu$ H |
| C121-123 | ECEV0JV470S  | Electrolytic | 47 $\mu$ F 6.3V  | L22     | YWNL458R2J   | Coil               | 8.2 $\mu$ H |
| C124     | ECEV1CV100   | Electrolytic | 10 $\mu$ F 16V   | L23,25  | ELJFC8R2MF   | Coil               | 8.2 $\mu$ H |
| C125     | ECEV0JV101   | Electrolytic | 100 $\mu$ F 6.3V | L28     | YWCDR74101MC | Coil               | 100 $\mu$ H |
| C126     | ECEV0GV221   | Electrolytic | 220 $\mu$ F 4V   | L29     | YWTLC0365P   | Coil               |             |
| C127-129 | ECEV1CV100   | Electrolytic | 10 $\mu$ F 16V   | X1      | EF0V8004E0A  | Crystal Oscillator |             |
| C130     | ECEV1CG331T  | Electrolytic | 330 $\mu$ F 16V  | X2      | YWDX17R734   | Crystal Oscillator |             |
| C131     | ECEV1CA101   | Electrolytic | 100 $\mu$ F 16V  | X3      | YWDX14R187   | Crystal Oscillator |             |
| C132     | ECEV0GV470   | Electrolytic | 47 $\mu$ F 4V    | CF1     | EIK4EW001T   | Filter             |             |
| C133     | ECEV1CA101   | Electrolytic | 100 $\mu$ F 16V  | CF3     | EIK4EW002T   | Filter             |             |
| C135     | ECEV0JA331   | Electrolytic | 330 $\mu$ F 6.3V | CF4     | YWNL4532S4R4 | Filter             |             |
| C136     | ECEV0JV220   | Electrolytic | 22 $\mu$ F 6.3V  | CF6     | ELB4B532     | Filter             |             |
| C137-139 | ECEV0JA331   | Electrolytic | 330 $\mu$ F 6.3V | CN1,2   | YWB8BZRS3TF  | 8-pin Connector    |             |
| C140-142 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   | CN3     | YWB5BZRS3TF  | 5-pin Connector    |             |
| C143     | ECST1VY104   | Tantalum     | 0.1 $\mu$ F 35V  | CN4     | YW31756386   | 6-pin Connector    |             |
| C144,145 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   | CN5     | YWB2BZRS3TF  | 2-pin Connector    |             |
| C146     | ECST0GX106ZL | Tantalum     | 10 $\mu$ F 4V    | CN6     | YWB3BZRS3TF  | 3-pin Connector    |             |
| C147     | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   | CN7     | YW31756386   | 6-pin Connector    |             |
| C148     | ECST0GX106ZL | Tantalum     | 10 $\mu$ F 4V    | CN8     | YW31768906   | 6-pin Connector    |             |
| C149     | ECST1VY104ZR | Tantalum     | 0.1 $\mu$ F 35V  | CN9     | YWB2BZRS3TF  | 2-pin Connector    |             |
| C150-159 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   | CN10    | YWB8BZRS3TF  | 8-pin Connector    |             |
| C160     | TAJC156M010  | Tantalum     | 15 $\mu$ F 10V   | TP1,2   | YWRCT2125TPV | Test Point         |             |
| C162     | ECST1VY224Z  | Tantalum     | 0.22 $\mu$ F 35V |         |              |                    |             |
| C163     | TAJC156M010  | Tantalum     | 15 $\mu$ F 10V   |         |              |                    |             |
| C164     | ECST0JY335   | Tantalum     | 3.3 $\mu$ F 6.3V |         |              |                    |             |
| C165,166 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   |         |              |                    |             |
| C167     | TAJC336M004  | Tantalum     | 33 $\mu$ F 4V    |         |              |                    |             |
| C168     | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   |         |              |                    |             |
| C169,170 | TAJA105M016  | Tantalum     | 1 $\mu$ F 16V    |         |              |                    |             |
| C171     | ECST1EY105   | Tantalum     | 1 $\mu$ F 25V    |         |              |                    |             |
| C172-176 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   |         |              |                    |             |
| C177     | TAJA105M016  | Tantalum     | 1 $\mu$ F 16V    |         |              |                    |             |
| C178-180 | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   |         |              |                    |             |
| C181     | YW400474FZ   | Ceramic      | 0.47 $\mu$ F     |         |              |                    |             |
| C182     | YW5CH470J5VB | Ceramic      | 47 pF            |         |              |                    |             |
| C183     | YW5X103K2VB  | Ceramic      | 0.01 $\mu$ F     |         |              |                    |             |
| C185     | ECEV0JV101   | Electrolytic | 100 $\mu$ F 6.3V |         |              |                    |             |
| C186,187 | ECEV1EV220   | Electrolytic | 22 $\mu$ F 25V   |         |              |                    |             |
| C188     | ECEV0JV101   | Electrolytic | 100 $\mu$ F 6.3V |         |              |                    |             |
| C189     | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F      |         |              |                    |             |
| C190     | ECST1AB106   | Tantalum     | 10 $\mu$ F 10V   |         |              |                    |             |
| C191     | ECST1AY225ZR | Tantalum     | 2.2 $\mu$ F 10V  |         |              |                    |             |
| C192-194 | YW5F104Z2VB  | Ceramic      | 0.1 $\mu$ F      |         |              |                    |             |
| C195     | YW5CH471J5VB | Ceramic      | 470 pF           |         |              |                    |             |
| C196     | YW5CH101J5VB | Ceramic      | 100 pF           |         |              |                    |             |
| C197     | YW5X223K2VB  | Ceramic      | 0.022 $\mu$ F    |         |              |                    |             |
| C201     | YF400104FZT  | Ceramic      | 0.1 $\mu$ F      |         |              |                    |             |
| C203-205 | ECCF1H100DC  | Ceramic      | 10 pF 50V        |         |              |                    |             |
| L2       | ELJFC8R2MF   | Coil         | 8.2 $\mu$ H      |         |              |                    |             |

| REF.NO.             | PART NO.                           | DESCRIPTION                                               | REF.NO.                                | PART NO.     | DESCRIPTION            |
|---------------------|------------------------------------|-----------------------------------------------------------|----------------------------------------|--------------|------------------------|
| <b>SENSOR BOARD</b> |                                    |                                                           | <b>ACCESSORY PARTS/PACKAGING PARTS</b> |              |                        |
| PCB2 (RTL)<br>Q1    | YWVKYCF20J1A<br>2SC4617<br>2SD2216 | Printed Circuit Board Assy<br>Transistor or<br>Transistor | M40                                    | YWV8QA3075AN | Operating Instructions |
| Q2                  | 2SC4618                            | Transistor                                                | M41                                    | YWV7NA0045A4 | Card                   |
| D1                  | YWDA121                            | Diode or                                                  | M42                                    | YFV8SA0009CN | Safety Notice          |
|                     |                                    |                                                           | M43                                    | YWV6DB0031A4 | Fastener               |
|                     |                                    |                                                           | M44                                    | YWT20X35C03  | Polyethylene Bag       |
| D2                  | MA132K                             | Diode                                                     | M45                                    | XZB35X50C05  | Polyethylene Bag       |
| R1                  | MA728                              | Diode                                                     | M46                                    | XZB26X40C05  | Polyethylene Bag       |
| R2                  | ERJ3GEYJ223                        | Carbon 22K ohms 1/16W                                     | M47                                    | YWT10X10C03  | Polyethylene Bag       |
| R3                  | ERJ3GEYJ392                        | Carbon 3.9K ohms 1/16W                                    | M50                                    | YWV9CA2082AN | Packaging Assy         |
| R3                  | ERJ3GEYJ105                        | Carbon 1M ohms 1/16W                                      |                                        |              |                        |
| R4                  | ERJ3GEYJ104                        | Carbon 100K ohms 1/16W                                    |                                        |              |                        |
| R5                  | ERJ3GEYJ105                        | Carbon 1M ohms 1/16W                                      |                                        |              |                        |
| R6                  | ERJ3GEYJ101                        | Carbon 100 ohms 1/16W                                     |                                        |              |                        |
| R7                  | ERJ3GEYJ100                        | Carbon 10 ohms 1/16W                                      |                                        |              |                        |
| R8                  | ERJ3GEYJ222                        | Carbon 2.2K ohms 1/16W                                    |                                        |              |                        |
| VR1,2               | EVM7JGA30B14                       | Variable Resistor 10K ohms                                |                                        |              |                        |
| C1,2                | YF400104FZT                        | Ceramic 0.1 $\mu$ F                                       |                                        |              |                        |
| C3                  | YW5X102K5VB                        | Ceramic 1000 pF                                           |                                        |              |                        |
| C4                  | YW5F104Z2VB                        | Ceramic 0.1 $\mu$ F                                       |                                        |              |                        |
| C5                  | YW5F473Z2VB                        | Ceramic 0.047 $\mu$ F                                     |                                        |              |                        |
| C6                  | YW5F104Z2VB                        | Ceramic 0.1 $\mu$ F                                       |                                        |              |                        |
| C8                  | YW5F473Z2VB                        | Ceramic 0.047 $\mu$ F                                     |                                        |              |                        |
| C9                  | ECST1VX105ZR                       | Tantalum 1 $\mu$ F 35V                                    |                                        |              |                        |
| L1                  | ELJFC8R2MF                         | Coil 8.2 $\mu$ H                                          |                                        |              |                        |
| CN2,3               | YWB8BZRSM3TF                       | 8-pin Connector                                           |                                        |              |                        |
| <b>VR BOARD</b>     |                                    |                                                           |                                        |              |                        |
| PCB3 (RTL)<br>VR1   | YWVKBCF20P1A<br>EVM4GA00B24        | Printed Circuit Board Assy<br>Variable Resistor 20K ohms  |                                        |              |                        |
| VR2                 | EVM4GA00BY5                        | Variable Resistor 330K ohms                               |                                        |              |                        |
| CN1                 | YWY06S15T2EF                       | 6-pin Connector                                           |                                        |              |                        |
| <b>SWITCH BOARD</b> |                                    |                                                           |                                        |              |                        |
| PCB4 (RTL)<br>SW1   | YWVKCCF20P1A<br>YFKSD04            | Printed Circuit Board Assy<br>Slide Switch                |                                        |              |                        |
| CN1                 | YW1746366                          | 6-pin Connector                                           |                                        |              |                        |

# Parts Change Notice

**Subject : Improvement of Performance**

Model No. WV-CF20E

Effective From : Serial No. 44XXXXXX

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.

If new part numbers are shown, be sure to use them when ordering parts

| Reason for Change |                                 | + The circled item indicates the reason |  |
|-------------------|---------------------------------|-----------------------------------------|--|
| ①                 | Improve performance             |                                         |  |
| 2.                | Change of material or dimension |                                         |  |
| 3.                | To meet approved specification  |                                         |  |
| 4.                | Standardization                 |                                         |  |
| 5.                | Addition                        |                                         |  |
| 6.                | Deletion                        |                                         |  |
| 7.                | Correction                      |                                         |  |
| 8.                | Other                           |                                         |  |

| Interchangeability Code |                                | ++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column " |                                                                                                                                                                           |
|-------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parts                   | Set Production                 |                                                                                                          |                                                                                                                                                                           |
| A                       | Original → Early<br>New → Late |                                                                                                          | Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.                                              |
| ②                       | Original → Early<br>New → Late |                                                                                                          | Original parts may be used in early production sets only. New parts may be use in early or late production sets. Use original parts where possible, then stock new parts. |
| C                       | Original → Early<br>New → Late |                                                                                                          | New parts only may be used in early or late production sets. Stock new parts.                                                                                             |
| D                       | Original → Early<br>New → Late |                                                                                                          | Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.                          |
| E                       | Other                          |                                                                                                          |                                                                                                                                                                           |

| Part Number                                                                                                                                                                                                                                 |                   |              |               |                          |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|---------------|--------------------------|-------|
| Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by o mark are new parts used from this Parts Change Notice. |                   |              |               |                          |       |
| Ref No.                                                                                                                                                                                                                                     | Original Part No. | New Part No. | Notes (+, ++) | Part Name & Descriptions | Price |
| <b>MAIN BOARD</b>                                                                                                                                                                                                                           |                   |              |               |                          |       |
| R97                                                                                                                                                                                                                                         | ERJ3GEYJ104       | ERJ3GEYJ334  | 1, B          | Resistor                 |       |

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C-516 (F) 7

# Parts Change Notice

**Subject : Correction**

Model No. WV-CF20E

Effective From : Serial No. 58XXXXXX

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.  
If new part numbers are shown, be sure to use them when ordering parts

| Reason for Change                  |  | + The circled item indicates the reason |  |
|------------------------------------|--|-----------------------------------------|--|
| 1. Improve performance             |  |                                         |  |
| 2. Change of material or dimension |  |                                         |  |
| 3. To meet approved specification  |  |                                         |  |
| 4. Standardization                 |  |                                         |  |
| 5. Addition                        |  |                                         |  |
| 6. Deletion                        |  |                                         |  |
| 7. Correction                      |  |                                         |  |
| 8. Other                           |  |                                         |  |

| Interchangeability Code |                | ++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column * |                                                                                                                                                                           |
|-------------------------|----------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parts                   | Set Production |                                                                                                          |                                                                                                                                                                           |
| A Original<br>New       | Early<br>Late  |                                                                                                          | Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.                                              |
| B Original<br>New       | Early<br>Late  |                                                                                                          | Original parts may be used in early production sets only. New parts may be use in early or late production sets. Use original parts where possible, then stock new parts. |
| C Original<br>New       | Early<br>Late  |                                                                                                          | New parts only may be used in early or late production sets. Stock new parts.                                                                                             |
| D Original<br>New       | Early<br>Late  |                                                                                                          | Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.                          |
| E Other                 |                |                                                                                                          |                                                                                                                                                                           |

| Part Number                                                                                                                                                                                                                                 |                   |              |               |                          |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|---------------|--------------------------|-------|
| Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by o mark are new parts used from this Parts Change Notice. |                   |              |               |                          |       |
| Ref No.                                                                                                                                                                                                                                     | Original Part No. | New Part No. | Notes (+, ++) | Part Name & Descriptions | Price |
| <b>MAIN BOARD</b>                                                                                                                                                                                                                           |                   |              |               |                          |       |
| C101                                                                                                                                                                                                                                        | YW5X103K2VB       | YF400103XKT  | 7, C          | Capacitor                |       |

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# Parts Change Notice

**Subject : Improve Productivity**

Model No. WV-CF20E

Effective From : Serial No. 62XXXXXX

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.  
If new part numbers are shown, be sure to use them when ordering parts

| Reason for Change                  |  | + The circled item indicates the reason |  |
|------------------------------------|--|-----------------------------------------|--|
| 1. Improve performance             |  |                                         |  |
| 2. Change of material or dimension |  |                                         |  |
| 3. To meet approved specification  |  |                                         |  |
| 4. Standardization                 |  |                                         |  |
| 5. Addition                        |  |                                         |  |
| 6. Deletion                        |  |                                         |  |
| 7. Correction                      |  |                                         |  |
| 8. Other                           |  |                                         |  |

| Interchangeability Code |                | ++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column "                                                                  |  |
|-------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Parts                   | Set Production |                                                                                                                                                                           |  |
| A Original<br>New       | Early<br>Late  | Original or new parts may be used in early or late production set.<br>Use original parts until exhausted, then stock new parts.                                           |  |
| B Original<br>New       | Early<br>Late  | Original parts may be used in early production sets only. New parts may be use in early or late production sets. Use original parts where possible, then stock new parts. |  |
| C Original<br>New       | Early<br>Late  | New parts only may be used in early or late production sets.<br>Stock new parts.                                                                                          |  |
| D Original<br>New       | Early<br>Late  | Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.                          |  |
| E Other                 |                |                                                                                                                                                                           |  |

| Part Number       |                   | Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by o mark are new parts used from this Parts Change Notice. |               |                          |       |
|-------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|-------|
| Ref No.           | Original Part No. | New Part No.                                                                                                                                                                                                                                | Notes (+, ++) | Part Name & Descriptions | Price |
| <b>MAIN BOARD</b> |                   |                                                                                                                                                                                                                                             |               |                          |       |
| C113              | ECEV0JV220        | ECST1CX106ZR                                                                                                                                                                                                                                | 8, B          | Capacitor                |       |

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# Panasonic

# Parts Change Notice

**Subject :** Correction

**Model No.** WV-CF20E

**Effective From :** ALL

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.  
If new part numbers are shown, be sure to use them when ordering parts.

| <b>Reason for Change</b> <sup>+</sup> The circled item indicates the reason. If no marking, see the Notes in the bottom column. |  |  |
|---------------------------------------------------------------------------------------------------------------------------------|--|--|
| 1. Improve performance                                                                                                          |  |  |
| 2. Change of material or dimension                                                                                              |  |  |
| 3. To meet approved specification                                                                                               |  |  |
| 4. Standardization                                                                                                              |  |  |
| 5. Addition                                                                                                                     |  |  |
| 6. Deletion                                                                                                                     |  |  |
| ⑦ Correction                                                                                                                    |  |  |
| 8. Other                                                                                                                        |  |  |

| <b>Interchangeability Code</b> <sup>++</sup> The circled item indicates the interchangeability. If no marking, see the Notes in the bottom column. |                                                                                                   |                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parts                                                                                                                                              | Set Production                                                                                    |                                                                                                                                                                            |
| A Original<br>New                                                                                                                                  |  Early<br>Late | Original or new parts may be used in early or late production set.<br>Use original parts until exhausted, then stock new parts.                                            |
| B Original<br>New                                                                                                                                  |  Early<br>Late | Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts. |
| Ⓒ Original<br>New                                                                                                                                  |  Early<br>Late | New parts only may be used in early or late production sets.<br>Stock new parts.                                                                                           |
| D Original<br>New                                                                                                                                  |  Early<br>Late | Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.                           |
| E Other                                                                                                                                            |                                                                                                   |                                                                                                                                                                            |

| <b>Part Number</b> <sup>△</sup> Parts identified by △ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. <sup>○</sup> Parts identified by ○ mark are new parts used from this Parts Change Notice. |                   |              |                                        |                          |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|----------------------------------------|--------------------------|-------|
| Ref No.                                                                                                                                                                                                                                                                                  | Original Part No. | New Part No. | Notes ( <sup>+</sup> , <sup>++</sup> ) | Part Name & Descriptions | Price |
| ACCESSORY PARTS / PACKAGING PARTS                                                                                                                                                                                                                                                        |                   |              |                                        |                          |       |
| M43                                                                                                                                                                                                                                                                                      | YWV6DB0031A4      | YWVAKA0853AN | 7, C                                   | Camera Fixing Angle      |       |

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